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PATENT APPLICATION

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Daniel T. Bogard

Docket No. SIG000053

Title: METHOD AND APPARATUS FOR PROCESSING CONTENT DATA

Date: 10/30/2000

To the Honorable Commissioner
of Patents and Trademarks
Box Patent Application
Washington, D.C. 20231

REQUEST FOR FILING A NATIONAL PATENT APPLICATION

The applicant respectfully requests that the above captioned patent application be accepted for examination This patent application is a:

- [X] new patent application
- [ ] continuation in part (CIP) of Application Serial No. [ ] filed on [ ]
- [ ] divisional application of Application Serial No. [ ] filed on [ ]
- [ ] continuation application of Application Serial No. [ ] filed on [ ]

Accompanying this request is (as indicated by an "X" in the corresponding box):

- [X] 1. 41 pages of specification, which includes the claims and abstract, and 21 sheets of formal drawings;
- [X] 2. Combined Declaration and Power of Attorney;
- [X] 3. An Information Disclosure Statement along with the references;
- [ ] 4. A petition to extend the response for a priority application identified above;
- [X] 5. An assignment assigning all rights in the above referenced patent application to SigmaTel, Inc.;
- [X] 6. An assignment recording cover sheet;
- [X] 7. A verified statement establishing small entity status under 37 C.F.R. Sections 1.9 and 1.27;
- [X] 8. A certificate of mailing indicating that the above captioned patent application has been deposited as "Express Mail" with the United States Postal Service;
- [ ] 9. A certificate of mailing indicating that the above captioned patent application has been deposited with the United States Postal Service with sufficient postage as first class mail;
- [X] 10. A return postcard, and
- [ ] 11. A preliminary amendment.

The filing fee for the above captioned patent application is as follows:

Large entity status apply? [no]

				basic filing fee	355.00
total claims	46	extra per claim fee	9.00	extra claim fee	234.00
total ind claims	6	extra per ind claim fee	40.00	extra ind claim fee	120.00
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Respectfully submitted,

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PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant. Daniel T. Bogard

Examiner:

Serial No.

Art Group:

Filing Date:

Docket No. SIG000053

Title: METHOD AND APPARATUS FOR PROCESSING CONTENT DATA

10/30/2000

To the Honorable Commissioner
of Patents and Trademarks
Washington, D.C. 20231

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- [X] 1. A new patent application including 41 pages of specification, and 21 sheets of formal drawings;
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- [ ] 9. A preliminary amendment.

SigmaTel, Inc.
Customer No: 000024263

METHOD AND APPARATUS FOR PROCESSING CONTENT DATA

TECHNICAL FIELD OF THE INVENTION

This invention relates generally to processing content data and in particular to processing audio data, video data, multi-media data and/or text data.

BACKGROUND OF THE INVENTION

Figure 1 illustrates a diagram of a system 10 that includes a device 12, which may be a CD player, cassette player, DVD player, VCR, a cassette recorder, CD burner, a cellular telephone, wireless telephone and/or a combination thereof, operably coupled to headphones 14. The device 12 generates audio data that is transmitted to the headphones 14 via a left channel 20, ground 22 and a right channel 24. As such, the audio data may be provided to the headphones 14 as stereo data where left channel audio information is provided on left channel 20 and right channel audio information is provided on right channel 24 or the data may be provided as monotone audio where the same audio information is provided on both the left channel 20 and the right channel 24.

The headphone 14 may include a microphone 16 that captures audio data and provides the audio data to the device 12 via a separate wire connection labeled mic in 26. In addition, the headphones 14 may include a remote control input device 18. The type of remote control data produced by the remote control input device 18 will depend on the functionality of the device 12. For example, if device 12 is a CD player, the remote control information may be next track, pause, play, stop, volume, et cetera. Depending on the complexity of the remote control input device 18, the headphones 14 may include one to four additional wires to transmit remote control data to the device 12. These wires are labeled as remote control in 28.

The device 12 may also utilize the remote control in wires 28 to provide display information to the headphones 14. In such an embodiment, the headphones 14 would include a display for displaying such information. Display information would include, for example, volume settings, track number, et cetera. With the additional features of a microphone 16 and remote control device 18, multiple additional wires are needed to couple the headphones 14 to the device 12. The inclusion of extra wires adds to the cost, increases the complexity of manufacturing the headphones, and decreases the reliability of the headphone 14.

Therefore, a need exists for a method and apparatus that improves the processing of data and content data by a content processing device and a content display device.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 illustrates a schematic block diagram of a prior art system;

Figure 2 illustrates a schematic block diagram of a content processing device and content display device in accordance with the present invention;

Figure 3 illustrates a schematic block diagram of an alternate content processing device and an alternate content display device in accordance with the present invention;

Figure 4 illustrates a schematic block diagram of another alternate content processing device and another alternate content display device in accordance with the present invention;

Figure 5 illustrates a schematic block diagram of the data processing circuit of the content processing device of Figure 2 or Figure 4;

Figure 6 illustrates a schematic block diagram of the transceiving module of the content processing device of Figure 2;

Figure 7 illustrates a schematic block diagram of an embodiment of the data extraction circuit of Figure 6;

Figure 8 illustrates a schematic block diagram of an alternate embodiment of the data extraction circuit of Figure 6;

Figure 9 illustrates a schematic block diagram of the transceiving module of the content processing device of Figure 3;

Figure 10 illustrates a schematic block diagram of the data processing circuit of the content display device of Figure 2 or Figure 4;

Figure 11 illustrates a schematic block diagram of the transceiving module of the content display device of Figure 3 or Figure 4;

Figure 12 illustrates a schematic block diagram of an embodiment of the data extraction circuit of Figure 11;

Figure 13 illustrates a schematic block diagram of an alternate embodiment of the data extraction circuit for Figure 11;

Figure 14 illustrates a schematic block diagram of the transceiving module of the content display device of Figure 3;

Figure 15 illustrates a schematic block diagram of a portion of the transceiving modules for the content display device and the content processing device of Figures 2 through 4;

Figure 16 illustrates a schematic block diagram of a transmitting portion of the transceiver modules of the content processing device and content display device of Figures 2 through 4;

Figure 17 illustrates a schematic block diagram of an alternate content processing device and an alternate content display device in accordance with the present invention;

Figure 18 illustrates a logic diagram of a method for processing content data in accordance with the present invention;

Figure 19 illustrates a logic diagram of a method for Step 274 of Figure 18;

Figure 20 illustrates a logic diagram of an alternate method for processing content data in accordance with the present invention;

Figure 21 illustrates a logic diagram of a method for presenting content data and processing data in accordance with the present invention;

Figure 22 illustrates a logic diagram of a method for Steps 360 and 362 of Figure 21;

Figure 23 illustrates a logic diagram of a method for Steps 346 and 348 of Figure 21;

Figure 24 illustrates a logic diagram of an alternate method for presenting content data and processing data in accordance with the present invention; and

Figure 25 illustrates a logic diagram of a method for Steps 428 and 430 of Figure 24.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Generally, the present invention provides a method and apparatus for processing content data. Such a method and apparatus includes processing that begins by receiving modulated data via a channel that couples a content display device to a content processing device. The processing continues by introducing the content data onto the channel and separating the modulated data from the content data. The processing then continues by retrieving data from the modulated data, wherein the content display device modulates the modulated data. The processing continues by processing the data to produce presentation information (e.g., volume adjust). The processing then continues by processing the content data for presentation on the external content display device based on the presentation information (e.g., providing stereo audio signals to headphones at the adjusted volume level). With such a method and apparatus, remote control data, audio data, video data, text data and/or multi-media data may be transceived between a content processing device and a content display device utilizing a minimal number of interconnections.

The present invention can be more fully described with reference to Figures 2 through 25. Figure 2 illustrates a system 30 that includes a content processing device 32 and a content display device 34. The content processing device 32 may be any device that produces audio data, video data, text data, multi-media data, and/or a combination thereof for presentation to a user. The content display device 34 may be a headphone, LCD panel, plasma display, speakers, and/or any device that allows for audio data, video data, text data, multi-media data, and/or a combination thereof to be presented to a user.

The content processing device 32 includes a content processing module 36, a transceiving module 38 and data processing circuitry 40. The content processing module 36 generates content data 46 based on presentation information 44. The construct of the content processing module 36 is dependent on the particular type of content data 46 being generated. For example, the content data may be audio data, video data, text data, and/or multi-media data. For example, if the content data is audio data, the content processing

module 36 may be a digital signal processor programmed to produce digitized audio from stored files, may be a CD drive, magnetic tape reader, DVD player, cellular telephone circuitry, wireless telephone circuitry, AM tuner circuitry, FM tuner circuitry, satellite tuner circuitry, et cetera. The presentation information 44 is representative of data provided by the content display device 34 that effects the processing of the content data 46. For example, if the content data 46 corresponds to the playback of a CD, the presentation information 44 may be volume settings, track selections, pause, play, stop, et cetera.

The transceiving module 38 is operably coupled to the content display device 34 via a channel 36. The channel 36 may be a 3 wire interface (left channel, right channel, and ground), an infrared path, a radio frequency (RF) path, a fiber optics path, and/or any interface between 2 electronic components. The transceiving module 38 is operably coupled to transmit the content data 46 to the content display device 34 and to receive modulated data 58 from the content display device 34 via the channel 36. The transceiving module 38 separates the modulated data 58 from the content data 46. In addition, the transceiving module 38 demodulates the modulated data 58 to retrieve data 42.

The data processing circuitry 40 receives the retrieved data 42 and produces there from the presentation information 44. The retrieved data 42 may be indicative of the type of content data 46 being displayed by the content display device 34. For example, if the content data 46 is audio data, the retrieved data 42 will be indicative of volume selection, tuning, et cetera.

The content display device 34 includes a content processing module 48, a transceiving module 50, and data processing circuitry 52. The data processing circuitry 52 is operably coupled to receive inputs regarding functionality of the content processing device. The inputs may be remote control inputs, audio inputs, video inputs, text inputs, et cetera. The data processing circuitry 52 interprets the inputs to generate data 56. For example, if the inputs correspond to remote control inputs, the data processing circuitry

52 includes touch panel, switches, and/or any device for receiving such user inputs and interpreting the inputs to produce data 56 that represents the particular remote control operation that has been selected. Alternatively, if the inputs correspond to audio inputs, the data processing circuitry 52 digitizes audible inputs received via a microphone such that the data 56 includes digitized audio. As a further example, if the input corresponds to a video input, the data processing circuitry 52 includes circuitry similar to a digital camera that digitizes video such that the data 56 includes digitized video.

The transceiving module 50 receives the data 56 and modulates it to produce the modulated data 58. The transceiving module 50 places the modulated data 58 on the channel 36. In addition, the transceiving module 50 receives the content data 46 via channel 36. The transceiving module 50 provides the content data 46 to the content processing module 48. The content processing module 48 interprets the content data 46 to make a presentation 60 of the content data. The content processing module 48 will be dependent on the type of content data 46 being processed. For example, if the content data 46 is audio data, the content processing module 48 corresponds to circuitry to receive analog audio signals and provide such signals to speakers or headphones. If the content data is video data, the content processing module 48 includes circuitry for rendering the content data on a LCD panel, plasma panel, et cetera. Such circuitry for rendering audio signals audible and video data visible is known, thus no further discussion will be presented except to illustrate the concepts of the present invention.

Transceiving module 38 and transceiving module 50 are operably coupled via channel 36 to convey the content data 46 and the modulated data 50. By modulating the data 56 at a frequency that is distinct from the frequency of the content data 46, the modulated data 58 and the content data 46 may be transceived utilizing the same interconnections of channel 36. For example, if channel 36 is representative of a 3-wire interface (left channel, right channel, and ground), the modulated data 58 may be modulated on the left channel at a frequency of 1Mhz while the audio data on the left channel is in the frequency range of 20 Hz to 20Khz. Thus, when the transceiving modules 38 and 50 process this data, they filter the modulated data 58 from the content

data such that the modulated data 58 can be separately processed from the content data 46. As one of average skill in the art will appreciate, the modulated data and the content data may overlap in the frequency domain using conventional modulation schemes (e.g., CDMA).

Figure 3 illustrates a schematic block diagram of an alternate system 70 that includes a content processing device 72 and a content display device 74. The content processing device 72 includes the content processing module 36, a transceiving module 76 and data processing circuitry 78. In this embodiment, the content processing module 36 generates content data 46 as previously discussed with reference to Figure 2. The data processing circuitry 78 generates display data 80. Display data 80 may be representative of the manner in which the content data 46 is to be displayed on the content display device 74. For example, if the content data 46 corresponds to the playback of a compact disk, the display data 80 may include a volume setting, track number, et cetera. The data processing circuitry 78 includes known circuitry to generate such display data 80. For example, the circuitry to generate display data corresponding to the playback of a compact disk, playback of a cassette, playback of a DVD, playback of a video cassette, et cetera, which is known in the art. Thus, no further discussion will be presented on the construct of the data processing circuitry 78 except to illustrate the concepts of the present invention.

The transceiving module 76 receives the content data 46 and the display data 80. The transceiving module 76 modulates the display data 80 to produce modulated display data 82. The transceiving module 76 transmits the content data 46 and the modulated display data 82 to the content display device 74 via the channel 36. The modulated display data 82 is produced at a frequency that can be readily separated from the frequency of the content data 46. For example, if the content data 46 is audio data, its frequency range is 0 to 20Khz. The modulated display data 82 may utilize a spread spectrum modulation scheme or CDMA (code division multiple access). Such a modulation scheme is well known in the art thus, no further discussion will be presented except to illustrate the concepts of the present invention.

The content display device 74 includes the content processing module 48, a transceiving module 84, data processing circuitry 86 and a display 88. The transceiving module 84 receives the modulated display data 82 and the content data 46. The transceiving module separates the content data 46 from the modulated display data 82. The content data 46 is provided to the content processing module 48, which processes the content data 46 as previously described with reference to Figure 2. The transceiving module demodulates the modulated display data 82 to retrieve display data 90. The retrieve display data 90 is provided to the data processing circuitry 86. The data processing circuitry 86 processes the retrieved display data 90 and provides the processed data to display 88 for display. The construct of the data processing circuitry 86 will depend on the type of information to be displayed. For example, if the display data 90 corresponds to display of processing audio signals, for example, playback of a compact disk, cassette, et cetera, the display data may be digital representations of volume settings, track information, et cetera. As such, the circuitry 86 will interpret the data signals to drive an LCD display 88 or a plasma display 88. Such circuitry is known in the art, thus, no further discussion will be presented except to illustrate the concepts of the present invention.

Figure 4 illustrates a schematic block diagram of another system 100 that includes a content processing device 102 and a content display device 104. The content processing device 102 includes the content processing module 36, an external content display device detection module 118, a transceiving module 106, and data processing circuitry 108. The external content display device detection module 118 generates an inquiry 116 that is provided to the transceiving module 106. The transceiving module 106 provides the inquiry 116 to the content display device 104 via channel 36. The transceiving module 110 receives the inquiry 116 and provides it to identifying circuitry 114. Identifying circuitry 114 determines the capabilities 120 of the content display device 104, which are provided to the transceiving module 110. The transceiving module 110 provides the capabilities 120 to transceiving module 106 via channel 36. The transceiving module 106 provides the capabilities 120 to the external content display

device detection module 118. Based on an interpretation of the capabilities 120, the external content display device detection module 118 determines the capabilities of the content display device 104. For example, the inquiry generated by the content processing device 102 is seeking information to determine whether the content display device 104 is capable of producing remote control data, is capable of receiving display data, whether the inputs 54 are remote control inputs, video inputs and/or audio inputs, the type of display 88, and other related features of the content display device 104. The identifying circuitry 114, based on the inquiry 116, determines the capabilities 120. The determination may be done by a lookup table that includes the capabilities of the content display device 104 or an active inquiry of the content display device 104.

The content processing module 36 produces the content data 46 based on presentation information 44 as previously discussed. The data processing circuitry 108 includes the data processing circuitry 40 of Figure 2 and the data processing circuitry 78 of Figure 3. With such a combination of circuitry, the data processing circuitry 108 can process the retrieved data 42 to produce the presentation information 44 and also generate display data 80. The transceiving module 106 in addition to transmitting the inquiry 116 which is done prior to transmitting any content data or display data, includes the circuitry that comprises the transceiving module 38 of Figure 2 and the transceiving module 76 of Figure 3.

The content display device 104 includes the content processing module 48, a transceiving module 110, an identifying circuitry 114, data processing circuitry 112 and the display 88. The data processing circuitry 112 includes the data processing circuitry 52 of Figure 2 and the data processing circuitry 86 of Figure 3 to process the input 54 to produce data 56 and to process the retrieved display data 90. The transceiving module 100 includes the transceiving module 50 of Figure 2 and the transceiving module 84 of Figure 3. Note that if the content processing device 102 also includes control functions similar to the control functions of the content display device 104, one of the devices 102 or 104 will be selected to have priority.

Figure 5 illustrates a schematic block diagram of the data processing circuitry 40 or 108. The data processing circuitry 40 includes a parsing module 130, remote control circuitry 132 and signal processing module 134. The parsing module 130 is operably coupled to receive the retrieved data 42. The retrieved data 42 may be representative of digitized audio, digitized video, and/or incoming remote control data. In this illustration, the retrieved data 42 includes remote control data 136 and digitized audio 138. Note that the digitized audio is representative of audio signals that may be received via a microphone for recording spoken word, or may correspond to voice commands related to remote control data 136. The remote control data 136 may include volume adjustment data, stop data, play data, pause data, rewind data, fast forward data, next track data, channel up/down data, base boost data, record data, intensity data, contrast data, security access data, and/or telephone access code data.

The remote control circuitry 132 receives the remote control data 136 to produce the content presentation information 44. Based on the functionality of the content processing device, the remote control circuitry 132 will include various embodiments of circuitry. For example, if the content processing device is a audio playback device, such as a CD player, cassette player, et cetera, the remote control circuitry will receive digital representations of remote control data that corresponds to the playback of information and provides codes related thereto as to the content presentation information 44 to the content processing module 36.

The signal processing module 134 receives the digitized audio 138 and produces either remote control data 136 or audible signals 140. If the audio signals correspond to voice commands regarding the operation of the content processing device, the digitized audio signals 138 are representative of remote control information. The signal processing module 134 processes the digitized audio to produce the remote control data 136. In the alternative, the digitized audio 138 may be representative of speech that is to be rendered audible. The signal processing module 134 receives the digitized audio signals 138 and produces audible signals 140 therefrom, where the digitized audio signals 138 may be stored in the associated memory. The processing of digitized audio signals to produce

audible signals is well known in the art and is found in cellular telephone technology, CD playback equipment, DVD playback equipment, et cetera.

Figure 6 illustrates the transceiving module 38 of Figure 2. The transceiving module 38 includes a data extraction circuit 142, a high pass filter 146 and a gain module 144. The high pass filter 146 is operably coupled to channel 36 and to receive the content data 46. The high pass filter 146 separates the content data 46 from the modulated data 58. The modulated data is provided to a gain module 144 to produce gain modulated data 148. The gain module 144 may perform a level shift of the modulated data utilizing an RS232 receiver or a universal asynchronous receiver transmitter. The data extraction circuit 142 receives the gain modulated data 148 and produces there from the retrieved data 42. The data extraction circuit 142 may be implemented in a multiple of topologies; two of which are shown in Figures 7 and 8.

Figure 7 illustrates a schematic block diagram of the data extraction circuit 142 that includes a demodulator 150, a quantizer 152 and a digital filter 154. The demodulator 150, which may be an integrator, is operably coupled to receive the gained modulated data 148 and to produce demodulated data 156. Depending on the type of modulation that is used to produce the modulated data, the demodulator 150 will include the corresponding demodulation scheme. For example, if the modulation is done utilizing AM modulation, the demodulator will include AM demodulation, if FM modulation is used, the demodulator will include FM demodulation, if CDMA modulation is used, the demodulator 150 will include CDMA modulation.

The quantizer 152 receives the demodulated data 158 and produces quantized data 158 there from. The quantization of the demodulated data 156 is essentially a level shift function to produce the quantized data 158. The digital filter 154 receives the quantized data 158 and filters it to produce the retrieved data 42. One embodiment of the data extraction circuit 142 of Figure 7 is shown in greater detail in Figure 15, which will be described below.

Figure 8 illustrates an alternate schematic block diagram of the data extraction circuit 142. The data extraction circuit includes a correlator 160, a clock recovery circuit 162 and a phase comparator 164. The clock recovery circuit 162 is operably coupled to receive the gain modulated data 148 and to produce there from a clock signal 166. The correlator receives the gain modulated data 148 and the clock signal 166. The correlator utilizes the clock signal 166 to detect patterns of the data 42 in the gain modulated data 148 to produce the correlated data 168. The phase comparator 164 receives the correlated data 168 and produces there from the retrieved data 42. This type of data extraction is the type of data extraction typically performed to demodulate CDMA data.

Figure 9 illustrates a schematic block diagram of the transceiving module 76 of Figure 3. The transceiving module 76 includes a data modulator 170 and a combining module 172. The data modulator 170 includes a pseudo random code generator 174 and a modulator 176, which may be an AND gate and OR gate, Square Law modulator, and/or a ring modulator. The pseudo random code generator 174 generates a random code 178. The modulator 176 receives display data 80 and the random code 178. The modulator modulates the display data 80 based on the random code 178. Note that the modulator 176 may be an exclusive OR gate that receives the random code 178 via one input and the display data 80 be in another input or it may be a double balanced mixer. The modulator 176 produces the modulated display data 82 based on the random code 178 and display data 80.

The combining module 172 includes a high pass filter 180 and a high frequency isolation module 182. The high pass filter 182 and high frequency isolation module 182 are coupled to channel 36. The high pass filter 180 attenuates the content data 46 and passes the modulated display data 82 on to channel 36. The high frequency isolation module 182 passes the content data 46 while isolating it from the modulated display data 82 that is on channel 36. As such, the combining module 172 combines the content data 46 and the modulated display data 82 on to the channel 36 but separates the content data 46 from the modulated data 82 for internal processing.

Figure 10 illustrates a schematic block diagram of the data processing circuitry 52 of the content display device 34 of Figure 2. As shown, the data processing circuitry includes an input device 190 and a digitizing module 192. The input device 190 is operably coupled to receive input signals 194 which are audible analog input signals and to produce analog input signals 196. The input device 190 may be a microphone and corresponding circuitry to capture speech and produce analog input signals 196 there from. The digitizing module 192 receives the analog input signals 196 and produces there from digitized signals 198. The digitizing module 192 may include pulse code modulation digitizing circuitry and/or encryption circuitry, where such circuitry is known in the art.

Figure 11 illustrates a schematic block diagram of the transceiving module 84 of the content display device 74 of Figure 3. The transceiving module 84 includes a high pass filter 200, a gain module 202 and data extraction circuit 204. The high pass filter 200 is operably coupled to channel 36 and to separate the content data 46 from modulated display data 82. The gain module 202 receives the modulated display data 82 and produces there from gain modulated data 206. The gain module 202 may be a level shift device such that the gain modulated data 206 is a level shifted representation of the modulated display data 82. The data extraction circuit 204 receives the gain modulated data 206 and produces the retrieved displayed data 90. The data extraction circuitry may be constructed in a variety of embodiments, two of which are shown in Figures 12 and 13.

Figure 12 illustrates a schematic block diagram of the data extraction circuit 204 to include a demodulator 210, a quantizer 212 (i.e., a decision element that may be multi-state) and a digital filter 214. The demodulator 210, which may be an integrator, receives the gain modulated data 206 and produces there from demodulated data 216. The quantizer 212 receives the demodulated data 216 and produces there from quantized data 218. The digital filter 214 filters the quantized data 218 to produce the retrieved display data 90. Note that the construct of the demodulator 210 will be dependent upon the modulation scheme used to produce the modulated display data 82. If the modulation

scheme is AM (amplitude modulation), the demodulator will include amplitude demodulation circuitry, if the modulation scheme was frequency modulation, the demodulator 210 will include frequency demodulation, if the modulation scheme was CDMA or CDM, the demodulator 210 will include CMDA or CDM demodulation.

Figure 13 illustrates an alternate schematic block diagram of the data extraction circuit 204. The data extraction circuit 204 includes a correlator 220, a clock recovery circuit 224 and a phase comparator 222. The correlator 220 receives the gain modulated data 206 and a clock signal 228. The clock recovery circuit 224 generates the clock signal 228 based on the gain modulated data 206 such that the clock signal 228 is representative of the period of the gain modulated data 206. Based on these inputs, the correlator 220 produces correlated data 226. The phase comparator 222 receives the correlated data 226 and produces the retrieved display data 90. The functionality of the data extraction circuit 204 corresponds to data recovery in a CDMA, a coherent FM, a phase modulation, and/or an AM encoding scheme.

Figure 14 illustrates a schematic block diagram of the transceiving module 84 of the content display device 74 of Figure 3. The transceiving module 84 includes a data modulator 230 and an injection module 232. The data modulator 230 includes a pseudo random code generator 234 and a modulator 236. The pseudo random code generator 234 generates a random code 238. The modulator 236 receives data 56 and the random code 238. Utilizing the random code 238, the modulator 236 modulates data 56 to produce the modulated data 58.

The injection module 232 includes a high pass filter 240 and a high frequency isolation module 242. The high pass filter 240 and the high frequency isolation module 242 are operably coupled to channel 36. The high pass filter 240 is operably coupled to block the content data 46 from being provided to the data modulator 230 while passing the modulated data 58 onto channel 36. The high frequency isolation module 242 is operably coupled to receive the content data 46 from the channel and pass it to the content processing module 48 while attenuating the modulated data 58.

Figure 15 illustrates a schematic diagram of the receiving portion of an embodiment of transceiving modules 38, 50, 76, 84, 106, and 110. In this embodiment, the channel includes a left channel, right channel and ground. The left channel is indicative of L_{in}, the right channel is represented by R_{in}, and the ground is represented by the ground symbol. In this illustration, capacitor C_3 is a DC blocking capacitor and may have a capacitance value of greater than 470 micro Farads. Capacitor C_4 in the right channel path performs a similar function and has a similar capacitance value as capacitor C_4. Inductor L_1 and capacitor C_6 in the left channel path form a high frequency isolation circuit. As such, high frequency signals that are presented on L_{out}, which is coupled to the channel, are blocked via the high frequency isolation circuit L_1 and C_6. As such, modulated data that may appear on the left channel on channel 36 is blocked from being received via the circuitry coupled to L_{in}. The inductor L_2 and capacitor C_7 perform a similar high frequency isolation for the right channel.

Capacitor C_1, resistor R_1 and resistor R_3 form a high pass filter for extracting modulated data from the left channel. The extracted data is provided to the integrator, which is formed by the amplifier and resistors R_7, R_8, a diode, and capacitor C_5. Resistors R_5 and R_6 formulate a reference potential for the amplifier. Capacitor C_2, resistor R_2 and resistor R_4 formulate a balancing circuit when the modulated data is on the left channel. Alternatively, if modulated data is also on the right channel, capacitor C_2, resistor R_2 and resistor R_4 form a high pass filter for coupling modulated data into the integrator.

The output of the integrator is provided to an inverter, which performs a level shift function that is subsequently provided to a universal asynchronous receiver transmitter (UART), which is optional. The output of the UART provides the retrieved data 42 or the retrieved display data 90. Note that amplitude shift keying (ASK) modulation or phase modulation may be used as the modulation scheme by injected modulated data into resistor R_7.

Figure 16 illustrates the transmitting portion of an embodiment of transceiving module 38, 50, 76, 84, 106, and 110. In this illustration, the channel 36 is represented by a 3-wire channel that includes a left channel, a right channel and ground. In the left channel path, C_1 is a DC blocking capacitor that should have a capacitance value of 470 micro Farads or greater. The capacitor C_2 in the right channel path performs a similar function and should have a similar capacitance value. Inductor L_1 and capacitor C_3 form a high frequency isolation circuit that blocks high frequency signals that are on the channel from being received at the input of the left channel. Inductor L_2 and capacitor C_4 perform a similar function for the right channel.

The data 56 or display data 80 is provided to an RS232 receiver, which is optional, that produces an output which is coupled to an input of an exclusive OR gate. A random number generator produces a random number that is also provided to an input of the exclusive OR gate. The exclusive OR gate modulates the display data via the random number which is capacitively coupled through C_5 and provided onto the left channel of channel 36. The random number is capacitively coupled via C_6 to the right channel out such that the random number is provided to channel 36.

Figure 17 illustrates a schematic block diagram of an alternate content processing device 250 and an alternate content display device 260. The content processing device 250 includes a processing module 252 and memory 254. The content display device includes processing module 262 and memory 264. The processing module 252 or processing module 262 may be a single processing device or a plurality of processing devices. Such a processing device may be a microprocessor, microcontroller, digital signal processor, central processing unit, state machine, logic circuitry, and/or any device that manipulates signals (analog or digital) based on operational instructions. The memory 254 or 264 may be a single memory device or a plurality of memory devices. Such a memory device may be a random access memory, read only memory, floppy disk memory, system memory, volatile memory, non-volatile memory, and/or any device that stores digital information. Note that when the processing module 252 or processing module 262 implements 1 or more of its functions via a state machine or logic circuitry,

the memory 254 or 264 storing the corresponding operational instructions is embedded within the circuitry comprising the state machine or logic circuitry. The operational instructions stored in memory 254 and 264 and executed by processing modules 252 and 262 are further discussed in Figures 18 through 25.

Figure 18 illustrates a logic diagram of a method for processing content data. The process begins at 270 where modulated data is received via a channel coupling an external content display device to a content processing device. The process proceeds to Step 272 where the content data is introduced into the channel coupling the content processing device to the external content display device. The process then proceeds to Step 274 where the modulated data is separated from the content data. The process then proceeds to Step 276 where data is retrieved from the modulated data. The process then proceeds to Step 278 where the data is processed to produce presentation information. The process then proceeds to Step 280 where the content data is processed for presentation on the external content display device based on the presentation information. The process then proceeds to Step 282 where capabilities of the external content display device are detected in preparing the data.

The processing of the data to produce presentation information of Step 278 can be further described with reference to Steps 284 through Step 290. At Step 284, the data is parsed into remote control data and digitized audio. The process then proceeds to Step 286 where the remote control data is processed to produce content presentation codes, or the presentation information. The process then proceeds to Step 288 where the content data is processed based on the content presentation codes. The process then proceeds to Step 290 where the digitized audio is processed. The digitized audio is representative of audio signals received via a microphone of the external content display device.

Figure 19 illustrates a logic diagram of Step 274 of Figure 18. The processing begins at Step 300 where the channel is high pass filtered to separate the content data from the modulated data. The process then proceeds to Step 302 where gain is provided to the modulated data to produce gain modulated data. The process then proceeds to Step

304 wherein the data is extracted from the modulated data. The data may be extracted in several ways, two of which are shown in Steps 306 through 310 and Steps 312 through 316.

At Step 306, the gain modulated data is demodulated to produce demodulated data. The process then proceeds to Step 308 where the demodulated data is quantized to produce quantized data. The process then proceeds to Step 310 where the quantized data is digitally filtered to produce the data.

At Step 312, a clock signal is generated from the modulated data. The process then proceeds to Step 314 where, at a rate of the clock signal, patterns of the data is detected within the modulated data to produce correlated data. The process then proceeds to Step 316 where the correlated data is phase compared to produce the data.

Figure 20 illustrates a logic diagram of an alternate method for processing content data in accordance with the present invention. The process begins at Step 320 where display data is provided to an external content display device. The process then proceeds to Step 322 where the content data is processed for presentation on the external content display device. The process then proceeds to Step 324 where the display data is modulated to produce modulated display data. The process then proceeds to Step 326 where the modulated data is combined with the content data to produce transmit data. The process then proceeds to Step 328 where the transmit data is provided to the external content display device via a channel coupling the content processing device to the external content display device. The process then proceeds to Step 330 where capabilities of the external content display device are detected in comparing the data.

The processing of Step 324 is further described with reference to Steps 332 and 334. At Step 332 a pseudo random code is generated. The process then proceeds to Step 334 where the pseudo random code and the display data are modulated to produce the modulated display data.

The processing of Step 326 is further described in Steps 336 and 338. At Step 336 the modulated display data is high pass filtered to produce filtered data. The filtered data is provided on the channel. The processing then proceeds to Step 338 where the content data is high frequency isolated from the modulated display data by substantially attenuating the filtered data and passing the content data substantially unattenuated.

Figure 21 illustrates a logic diagram of a method for presenting content data and processing data in accordance with the present invention. The process begins at Steps 340, 352, 358 and 366. Each of these steps and corresponding steps are performed in parallel, however, as one of average skill in the art will appreciate, they may be performed in a serial manner and/or in any combination of a parallel or serial manner.

At Step 340, inputs are received regarding the functionality of an external content processing device. Such inputs may be indicative of volume settings, selecting tracks of a CD et cetera. The process then proceeds to Step 342 where the inputs are processed to produce data regarding the functionality of an external content processing device. The process then proceeds to Step 344 where the data is modulated to produce modulated data. The process then proceeds to Step 346 where the content data is received via a channel coupled to the external content processing device. The process then proceeds to Step 348 where the modulated data is transmitted to the external content processing device via the channel. The process then proceeds to Step 350 where the content data is processed for presentation.

At Step 352 an analog input signal is received. The process then proceeds to Step 354 where the analog input signal is digitized to produce a digitized signal. The process then proceeds to Step 356 where the digitized signal is provided as at least part of the data from modulating. As such, the digitized signal will be modulated and provided to the content processing device via the channel.

At Step 358, modulated display data is received via the channel. The process then proceeds to Step 360 where the modulated display data is separated from the content

data. The process then proceeds to Step 362 where display data is retrieved from the modulated display data. The process then proceeds to Step 364 where the display data is displayed.

At Step 366, an inquiry is received via the channel from the external content processing device. The process then proceeds to Step 368 where the inquiry is processed to produce content display capabilities. The process then proceeds to Step 370 where the content display capabilities are provided to the external content processing device via the channel.

Figure 22 illustrates a logic diagram of further processing of Steps 360 and 362 of Figure 21. The processing begins at Step 380 where the channel is high pass filtered to separate the content data from the modulated data. The process then proceeds to Step 382 where gain is provided to the modulated data to produce gain modulated data. The process then proceeds to Step 384 where the display data is extracted from the modulated display data. The extracting of the display data may be done in a variety of ways, two of which are shown in Steps 386 through 390 and Steps 392 through 396.

In Step 386, the gain modulated data is demodulated to produce demodulated data. The process then proceeds to Step 388 where the demodulated data is quantized to produced quantized data. The process then proceeds to Step 390 where the quantized data is digitally filtered to produce the display data.

At Step 392, a clock signal is generated from the modulated display data. The process then proceeds to Step 394 where patterns of the displayed data are correlated with patterns contained within the modulated display data to produce correlated. The process then proceeds to Step 396 where the correlated data is phased compared to produce the data.

Figure 23 illustrates the further processing of Steps 346 and 348 of Figure 21. Such further processing begins at Step 400 where the data is modulated to produce

modulated data. This may be done by generating a pseudo random code as shown at Step 404. After generating the pseudo random code, the process would proceed to Step 406 where the random code and the data are modulated to produce the modulated data.

Returning to the main flow, the process proceeds to Step 402 where the modulated data is injected onto the channel with the content data to produce transceived data. The transceived data is provided to the external content processing device. Step 402 is shown in further detail with respect to Steps 408 and 410. At Step 408, the modulated data is high pass filtered to produce filtered data. The filtered data is provided on the channel. The process then proceeds to Step 410 where the content data is high frequency isolated from the modulated data by substantially attenuating the filtered data and passing the content data substantially unattenuated.

Figure 24 illustrates a logic diagram of an alternate method for processing content data and processing data in accordance with the present invention. The processing begins at Step 420 or 426. At Step 420 an inquiry is received via the channel from the external content processing device. The process then proceeds to Step 422 where the inquiry is processed to produce content display capabilities. The process then proceeds to Step 424 where the content display capabilities are provided to the external content processing device via the channel.

At Step 426, modulated display data and content data are received via a channel coupling the content display device to an external content processing device. The process then proceeds to Step 428 where the modulated data is separated from the content data. The process then proceeds to Step 430 where display data is retrieved from the modulated data. The process then proceeds to Step 432 where the display data is processed for display. The process then proceeds to Step 434 where the content data is processed for presentation.

Figure 25 illustrates further processing of Steps 428 and 430 of Figure 24. Such further processing begins at Step 440 where the channel is high pass filtered to separate

the content data from the modulated data. The process then proceeds to Step 442 where gain is provided to the modulated data to produce gain modulated data. The process then proceeds to Step 444 where the display data is extracted from the modulated data. The extracting of display data from modulated data may be done in a variety of ways, two of which are shown in Steps 446 through 450 and Steps 452 through 456.

At Step 446, the gain modulated data is demodulated to produce demodulated data. The process then proceeds to Step 448 where the demodulated data is quantized to produce quantized data. The process then proceeds to Step 450 where the quantized data is digitally filtered to produce the display data.

At Step 452, a clock signal is generated from the modulated data. The process then proceeds to Step 454 where patterns of the data contained within the modulated data are detected to produce correlated data. The process then proceeds to Step 456 where the correlated data is phase compared to produce the display data.

The preceding discussion has presented a method and apparatus for minimizing the number of interfaces required to couple a content processing device to a content display device. For example, when the content processing device is an audio player such as a cassette player, DVD player, CD player, et cetera and the content display device is a headphone with a microphone, remote control input circuitry, and a display, only three wires are needed to couple the display device with the processing device. The extra data of remote control device and display information are modulated on the content data (e.g. the audio data). As one of average skill in the art will appreciate, other embodiments may be derived from the teaching of the present invention without deviating from the scope of the claims.

CLAIMS

What is claimed is:

1. A device for processing content data, the device comprises:

data processing circuitry operably coupled to process data received from an external content display device to produce presentation information;

content processing module operably coupled to process content data for presentation on the external content display device based on the presentation information; and

transceiving module operably coupled to the data processing circuitry and the content processing module, wherein the transceiving module separates modulated data from the content data, wherein the transceiving module retrieves the data from the modulated data, and wherein the transceiving module introduces the content data into a channel coupling the device to the external content display device.

2. The device of claim 1, wherein the content data comprises at least one of: audio data, video data, text data, and multimedia data.

3. The device of claim 1, wherein the data comprises at least one of: digitized audio, digitized video, and incoming remote control data.

4. The device of claim 3, wherein the remote control data comprises at least one of: volume adjust data, stop data, play data, pause data, rewind data, fast forward data, next track data, channel up/down data, bass boost data, record data, intensity data, contrast data, security access data, and telephone access code data.

5. The device of claim 3, wherein the data processing circuitry comprises:

parsing module operably coupled to receive the data, wherein the parsing module separates the data into the remote control data and the digitized audio;

remote control circuitry for process the remote control data to produce content presentation information, wherein the remote control circuitry provides the content presentation information to the content processing module, and wherein the content processing module processes the content data based on the content presentation information; and

signal processing module operably coupled to process the digitized audio, wherein the digitized audio is representative of audio signals received via a microphone of the external content display device.

6. The device of claim 1, wherein the transceiving module comprises:

high pass filter to separate the content data from the modulated data;

gain module operably coupled to provide gain to the modulated data to produce gained modulated data; and

data extraction circuit operably coupled to retrieve the data from the gain modulated data.

7. The device of claim 6, wherein the data extraction circuit comprises:

demodulator operably coupled to receive the gain modulated data and to produce therefrom demodulated data;

quantizer operably coupled to receive the demodulated data and to produce therefrom quantized data; and

digital filter operably coupled to receive the quantized data and produce therefrom the data.

8. The device of claim 6, wherein the data extraction circuit comprises:

clock recovery circuit operably coupled to generate a clock signal from the gain modulated data;

a correlator operably coupled to receive the clock signal, wherein the correlator detect patterns of the data contained within the modulated data to produce correlated data; and

phase comparator operably coupled to receive the correlated data and to produce therefrom the data.

9. The device of claim 1, wherein the data processing circuitry further comprises:

display information module operably coupled to provide outgoing display data to the transceiving module.

10. The device of claim 9, wherein the transceiving module further comprises:

data modulator operably coupled to modulate the outgoing display data to produce modulated outgoing display data; and

combining circuit operably coupled to combine the content data and the modulated display data to produce transmit data that is provided to the external content display device.

11. The device of claim 10, wherein the data modulator comprises:

pseudo random code generator operably coupled to produce a random code; and

modulator operably coupled to receive the random code and the outgoing display data to produce the modulated display data.

12. The device of claim 10, wherein the combining circuit comprises:

high pass filter operably coupled to the channel, wherein the high pass filter filters the modulated display data to produce filtered data, wherein the filtered data is provided on the channel; and

high frequency isolation module operably coupled to the channel, wherein the high frequency isolation module substantially attenuates the filtered data and passes the content data substantially untenanted such that the content data is isolated from the modulated display data.

13. The device of claim 1 further comprises:

an external content display device detection module operably coupled to detect capabilities of the external content display device in preparing the data.

14. A device for processing content data, the device comprises:

data processing circuitry operably coupled to provide display data to an external content display device;

content processing module operably coupled to process content data for presentation on the external content display device; and

transceiving module operably coupled to the data processing circuitry and the content processing module, wherein the transceiving module combines the display data and the content data to produce transmit data, wherein the transceiving module provides the transmit data to the external content display device via a channel coupling the device to the external content display device.

15. The device of claim 14, wherein the transceiving module further comprises:

data modulator operably coupled to modulate the display data to produce modulated display data; and

combining circuit operably coupled to combine the content data and the outgoing display data to produce the transmit data.

16. The device of claim 15, wherein the data modulator comprises:

pseudo random code generator operably coupled to produce a random code; and

modulator operably coupled to receive the random code and the display data to produce the modulated display data.

17. The device of claim 15, wherein the combining circuit comprises:

high pass filter operably coupled to the channel, wherein the high pass filter filters the modulated display data to produce filtered data, wherein the filtered data is provided on the channel; and

high frequency isolation module operably coupled to the channel, wherein the high frequency isolation module substantially attenuates the filtered data and passes the content data substantially untenanted such that the content data is isolated from the transmit modulated data.

18. The device of claim 14 further comprises:

an external content display device detection module operably coupled to detect capabilities of the external content display device in preparing the data.

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19. A method for processing content data, the method comprises the steps of:

receiving modulated data via a channel coupled to an external content display device;

introducing the content data into the channel coupling the device to the external content display device;

separating the modulated data from the content data;

retrieving data from the modulated data;

processing the data to produce presentation information; and

processing content data for presentation on the external content display device based on the presentation information.

20. The method of claim 19, wherein the data comprises at least one of: digitized audio, digitized video, and incoming remote control data, further comprises:

parsing the data into the remote control data and the digitized audio;

processing the remote control data to produce content presentation codes;

processing the content data based on the content presentation codes; and

processing the digitized audio, wherein the digitized audio is representative of audio signals received via a microphone of the external content display device.

21. The method of claim 19, wherein the separating the modulated data from the content data further comprises:

high pass filtering the channel to separate the content data from the modulated data;

providing gain to the modulated data to produce gained modulated data; and

extracting the data from the modulated data.

22. The method of claim 21, wherein the extracting the data further comprises:

demodulating the gain modulated data to produce demodulated data;

quantizing the demodulated data to produce quantized data; and

digital filtering the quantized data to produce the data.

23. The method of claim 21, wherein the extracting the data further comprises:

generating a clock signal from the modulated data;

detecting, at a rate of the clock signal, patterns of the data contained within the modulated data to produce correlated data; and

phase comparing the correlated data to produce the data.

24. The method of claim 19 further comprises:

modulating display data to produce modulated display data; and

combining the content data and the modulated display data to produce transmit data that is provided to the external content display device.

25. The method of claim 24, wherein the modulating the display data further comprises:

generating a pseudo random code; and

modulating the pseudo random code and the display data to produce the modulated display data.

26. The method of claim 24, wherein the modulating the display data further comprises:

high pass filtering the modulated display data to produce filtered data, wherein the filtered data is provided on the channel; and

high frequency isolating the content data from the modulated display data by substantially attenuating the filtered data and passing the content data substantially untenanted.

27. The method of claim 19 further comprises:

detecting capabilities of the external content display device in preparing the data.

28. A method for processing content data, the method comprises the steps of:

providing display data to an external content display device;

processing content data for presentation on the external content display device;

modulating the display data to produce modulated display data;

combining the modulated display data and the content data to produce transmit data; and

providing the transmit data to the external content display device via a channel coupling the device to the external content display device.

29. The method of claim 28, wherein the combining the display data and the content data further comprises:

modulating the display data at a rate that is substantially higher than the rate of the content data to produce modulated display data.

30. The method of claim 29, wherein the modulating the display data further comprises:

producing a pseudo random code; and

modulating the pseudo random code and the display data to produce the modulated display data.

31. The method of claim 28, wherein the combining further comprises:

high pass filtering the modulated display data to produce filtered data, wherein the filtered data is provided on the channel; and

high frequency isolating the content data from the modulated display data by substantially attenuating the filtered data and passing the content data substantially untenanted.

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32. The method of claim 28 further comprises:

detecting capabilities of the external content display device in preparing the data.

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33. A device for processing content data, the device comprises:

a processing module; and

memory operably coupled to the processing module, wherein the memory includes operational instructions that cause the processing module to:

receive modulated data via a channel coupled to an external content display device;

introduce the content data into the channel coupling the device to the external content display device;

separate the modulated data from the content data;

retrieve data from the modulated data;

process the data to produce processed data to produce presentation information; and

process content data for presentation on the external content display device based on the presentation information.

34. The device of claim 33, wherein the data includes at least one of: digitized audio, digitized video, and incoming remote control data, wherein the memory further comprises operational instructions that cause the processing module to:

parse the data into the remote control data and the digitized audio;

process the remote control data to produce content presentation codes;

process the content data based on the content presentation codes; and

process the digitized audio, wherein the digitized audio is representative of audio signals received via a microphone of the external content display device.

35. The device of claim 33, wherein the memory further comprises operational instructions that cause the processing module to separate the modulated data from the content data by:

high pass filtering the channel to separate the content data from the modulated data;

providing gain to the modulated data to produce gained modulated data; and

extracting the data from the modulated data.

36. The device of claim 35, wherein the memory further comprises operational instructions that cause the processing module to extract the data by:

demodulating the gain modulated data to produce demodulated data;

quantizing the demodulated data to produce quantized data; and

digital filtering the quantized data to produce the data.

37. The device of claim 35, wherein the memory further comprises operational instructions that cause the processing module to extract the data by:

generating a clock signal from the modulated data;

detecting, at a rate of the clock signal, patterns of the data contained within the modulated data to produce correlated data; and

phase comparing the correlated data to produce the data.

38. The device of claim 33, wherein the memory further comprises operational instructions that cause the processing module to:

modulate display data to produce modulated display data; and

combine the content data and the modulated display data to produce transmit data that is provided to the external content display device.

39. The device of claim 38, wherein the memory further comprises operational instructions that cause the processing module to modulate the display data by:

generating a pseudo random code; and

modulating the pseudo random code and the display data to produce the modulated display data.

40. The device of claim 38, wherein the memory further comprises operational instructions that cause the processing module to modulate the display data by:

high pass filtering the transmit modulated display data to produce filtered data, wherein the filtered data is provided on the channel; and

high frequency isolating the content data from the modulated display data by substantially attenuating the filtered data and passing the content data substantially untenanted.

41. The device of claim 33, wherein the memory further comprises operational instructions that cause the processing module to:

detecting capabilities of the external content display device in preparing the data.

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42. A device for processing content data, the device comprises:

a processing module; and

memory operably coupled to the processing module, wherein the memory includes operational instructions that cause the processing module to:

provide display data to an external content display device;

process content data for presentation on the external content display device;

modulate the display data to produce modulated display data;

combine the modulated display data and the content data to produce transmit data; and

provide the transmit data to the external content display device via a channel coupling the device to the external content display device.

43. The device of claim 42, wherein the memory further comprises operational instructions that cause the processing module to combine the display data and the content data by:

modulating the display data at a rate that is substantially higher than the rate of the content data to produce modulated display data.

44. The device of claim 43, wherein the memory further comprises operational instructions that cause the processing module to modulate the display data further comprises:

producing a pseudo random code; and

modulating the pseudo random code and the display data to produce the modulated display data.

45. The device of claim 42, wherein the memory further comprises operational instructions that cause the processing module to combine by:

high pass filtering the transmit modulated data to produce filtered data;

summing the filtered data and the content data to produce the transmit data; and

high frequency isolating the content data from the transmit data.

46. The device of claim 42, wherein the memory further comprises operational instructions that cause the processing module to:

detect capabilities of the external content display device in preparing the data.

METHOD AND APPARATUS FOR PROCESSING CONTENT DATA

ABSTRACT OF THE DISCLOSURE

A method and apparatus for processing content data includes processing that begins by receiving modulated data via a channel that couples a content display device to a content processing device. The processing continues by introducing the content data onto the channel and separating the modulated data from the content data. The processing then continues by retrieving data from the modulated data, wherein the content display device modulates the modulated data. The processing continues by processing the data to produce presentation information. The processing then continues by processing the content data for presentation on the external content display device based on the presentation information.

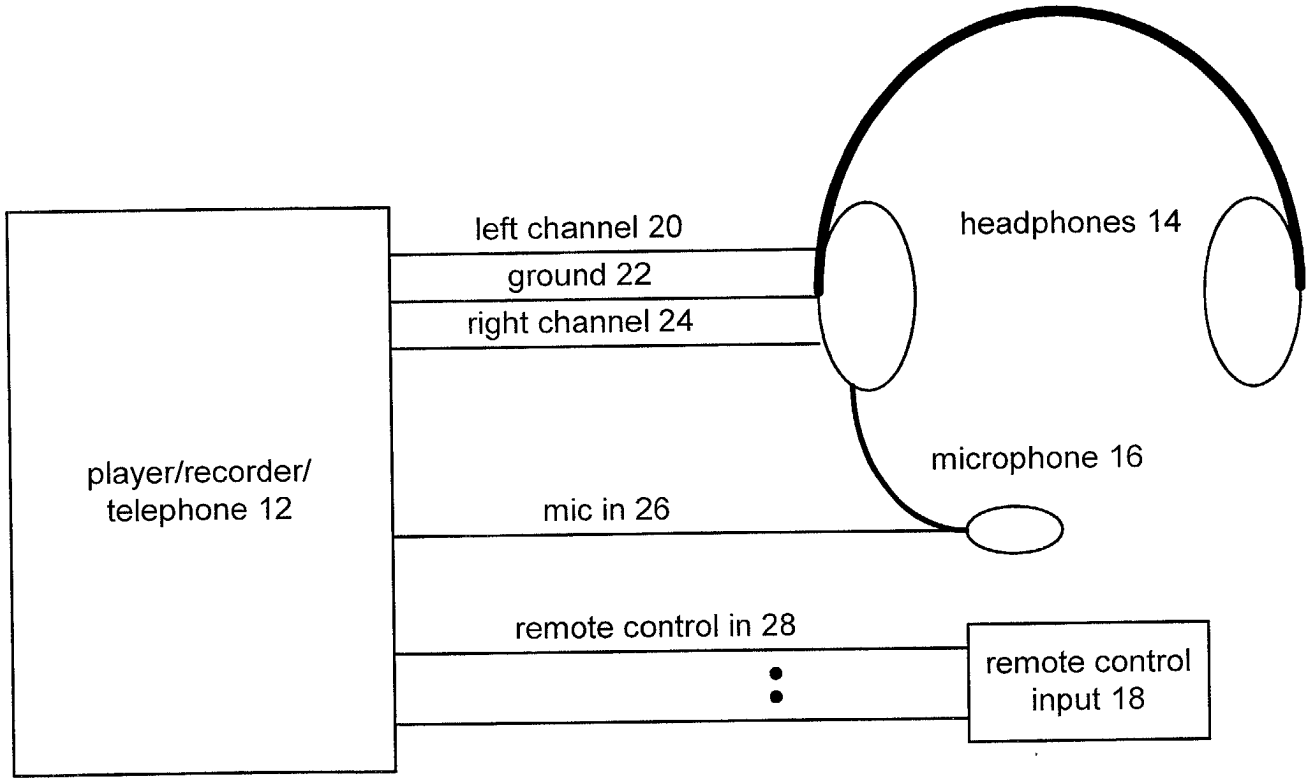

FIG. 1
(prior art)

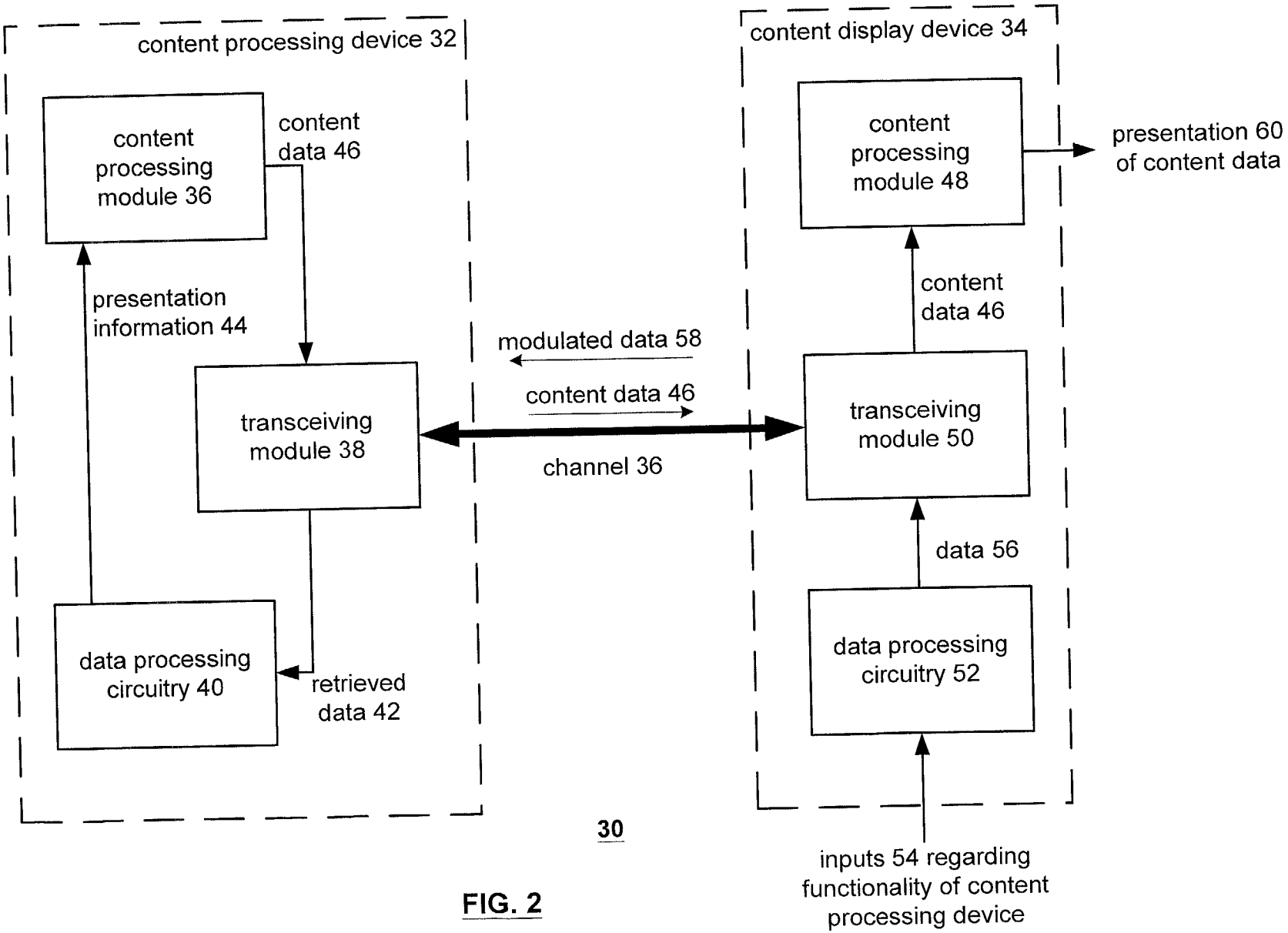
content processing device 32
content display device 34
content processing module 36
content data 46
content processing module 48
presentation 60 of content data
presentation information 44
modulated data 58
content data 46
content data 46
transceiving module 38
transceiving module 50
channel 36
data 56
data processing circuitry 40
retrieved data 42
data processing circuitry 52
30
inputs 54 regarding functionality of content processing device

FIG. 2

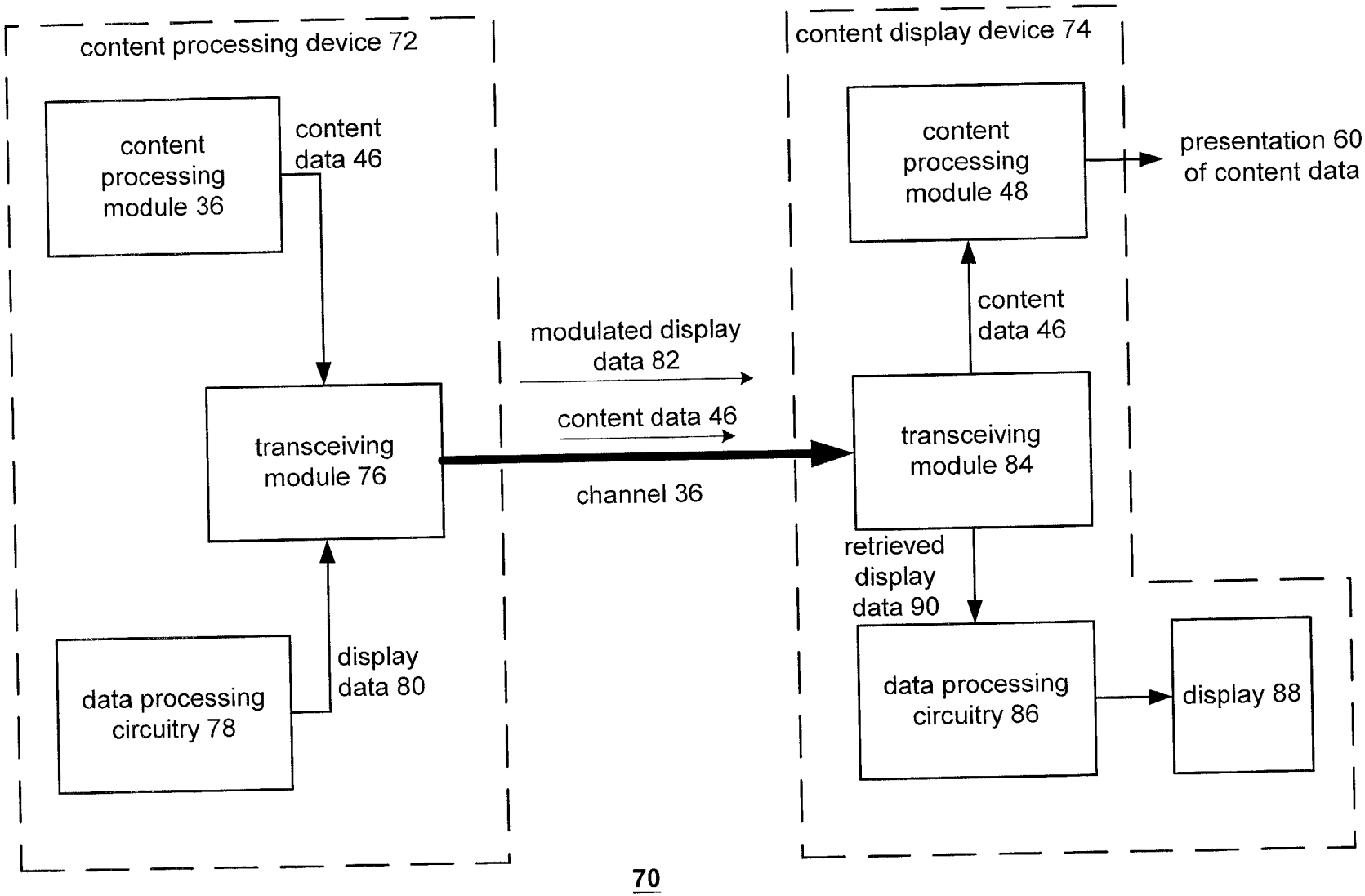
content processing device 72
content processing module 36
content data 46
transceiving module 76
data processing circuitry 78
display data 80
modulated display data 82
content data 46
channel 36
content display device 74
content processing module 48
presentation 60 of content data
content data 46
transceiving module 84
retrieved display data 90
data processing circuitry 86
display 88
70

FIG. 3

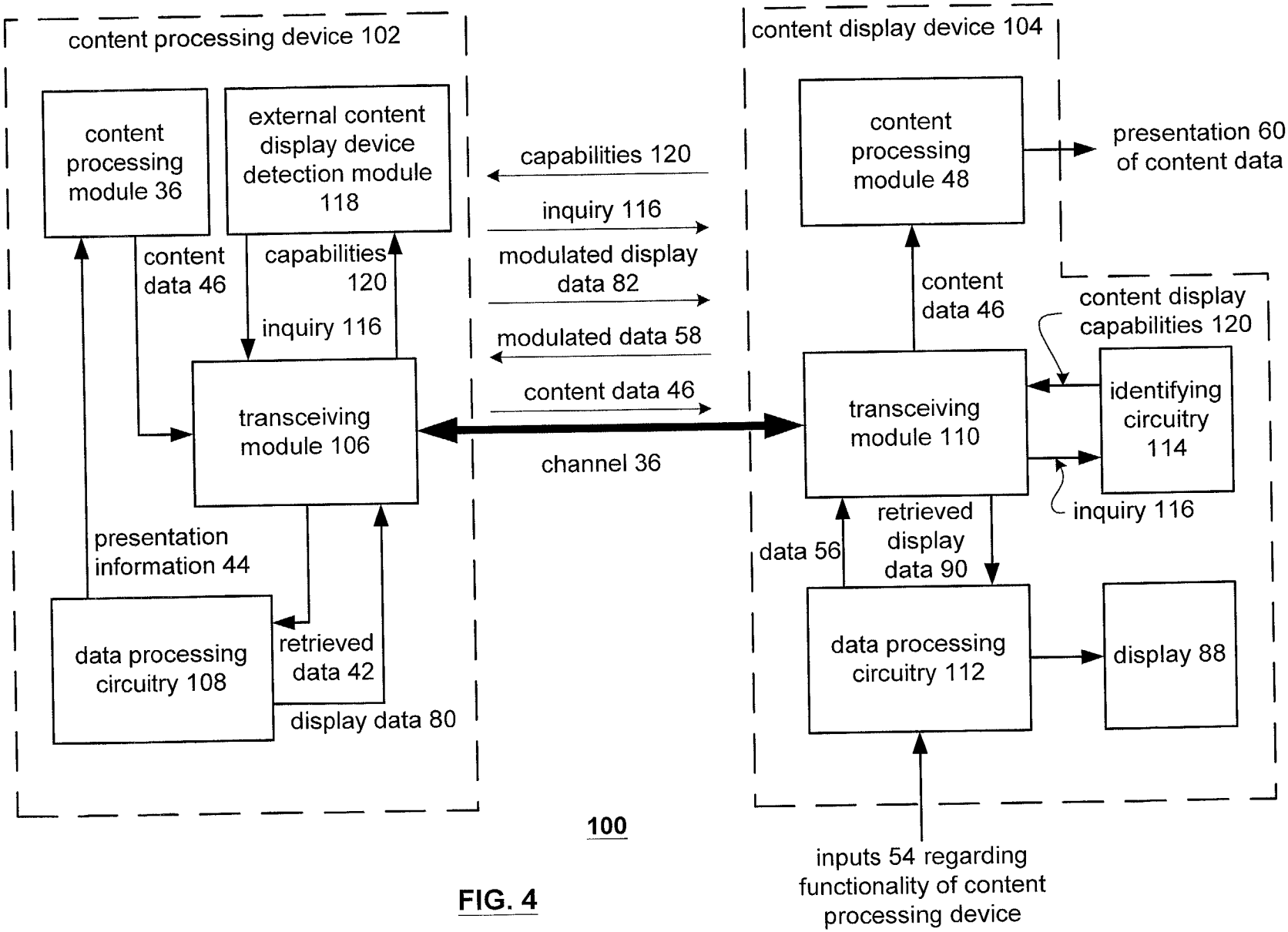
content processing device 102
content display device 104
content processing module 36
external content display device detection module 118
capabilities 120
inquiry 116
modulated display data 82
modulated data 58
content data 46
content processing module 48
presentation 60 of content data
content data 46
capabilities 120
inquiry 116
content data 46
content display capabilities 120
transceiving module 106
channel 36
transceiving module 110
identifying circuitry 114
inquiry 116
presentation information 44
retrieved data 42
display data 80
data processing circuitry 108
data 56
retrieved display data 90
data processing circuitry 112
display 88
100
inputs 54 regarding functionality of content processing device

FIG. 4

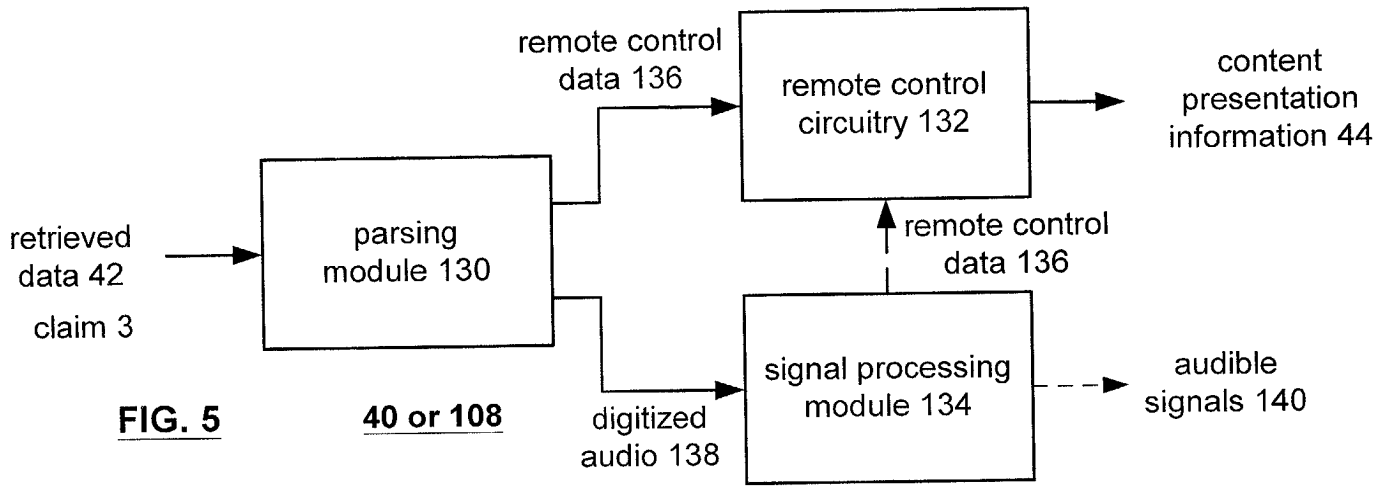
remote control
data 136
remote control
circuitry 132
content
presentation
information 44
retrieved
data 42
claim 3
parsing
module 130
remote control
data 136
signal processing
module 134
audible
signals 140
digitized
audio 138
40 or 108

FIG. 5

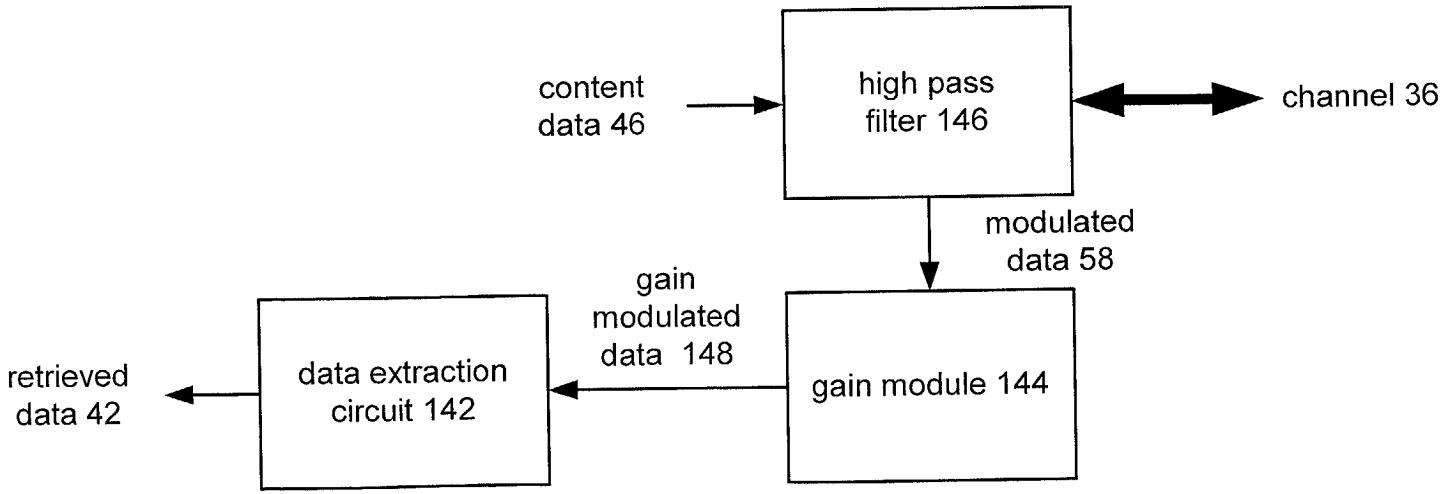
content
data 46
high pass
filter 146
channel 36
modulated
data 58
gain
modulated
data 148
retrieved
data 42
data extraction
circuit 142
gain module 144
38

FIG. 6

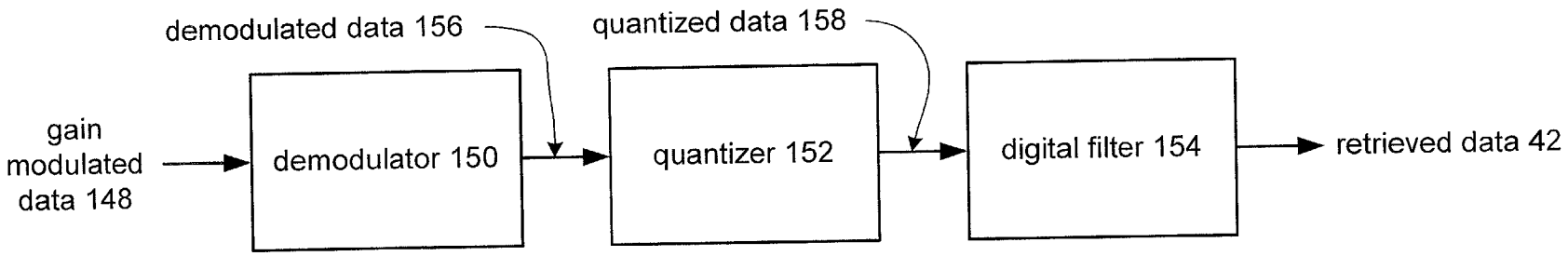

FIG. 7 142

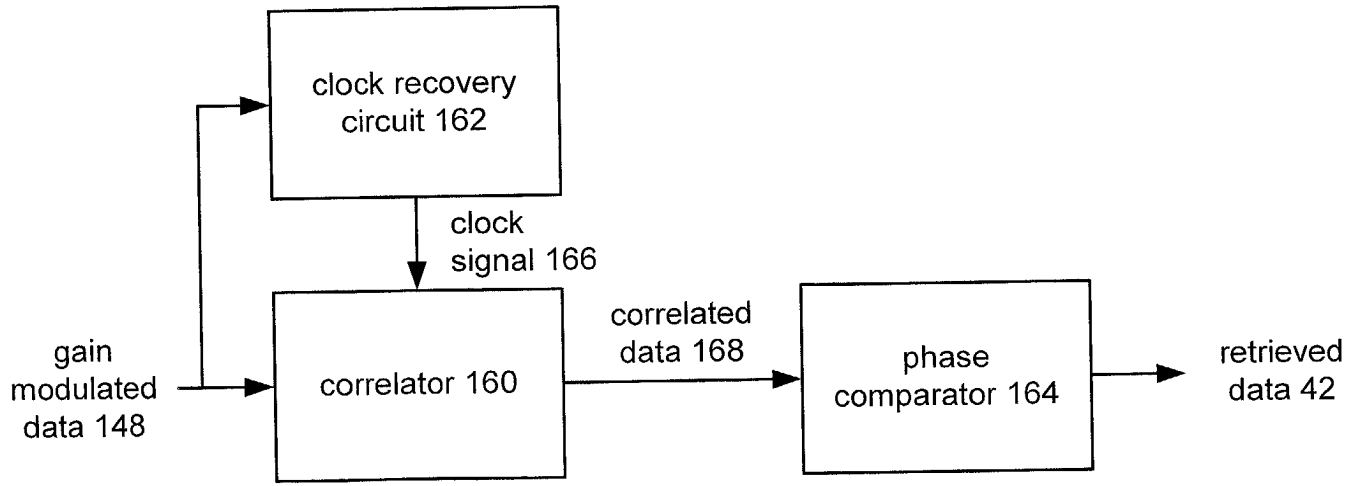

FIG. 8 142

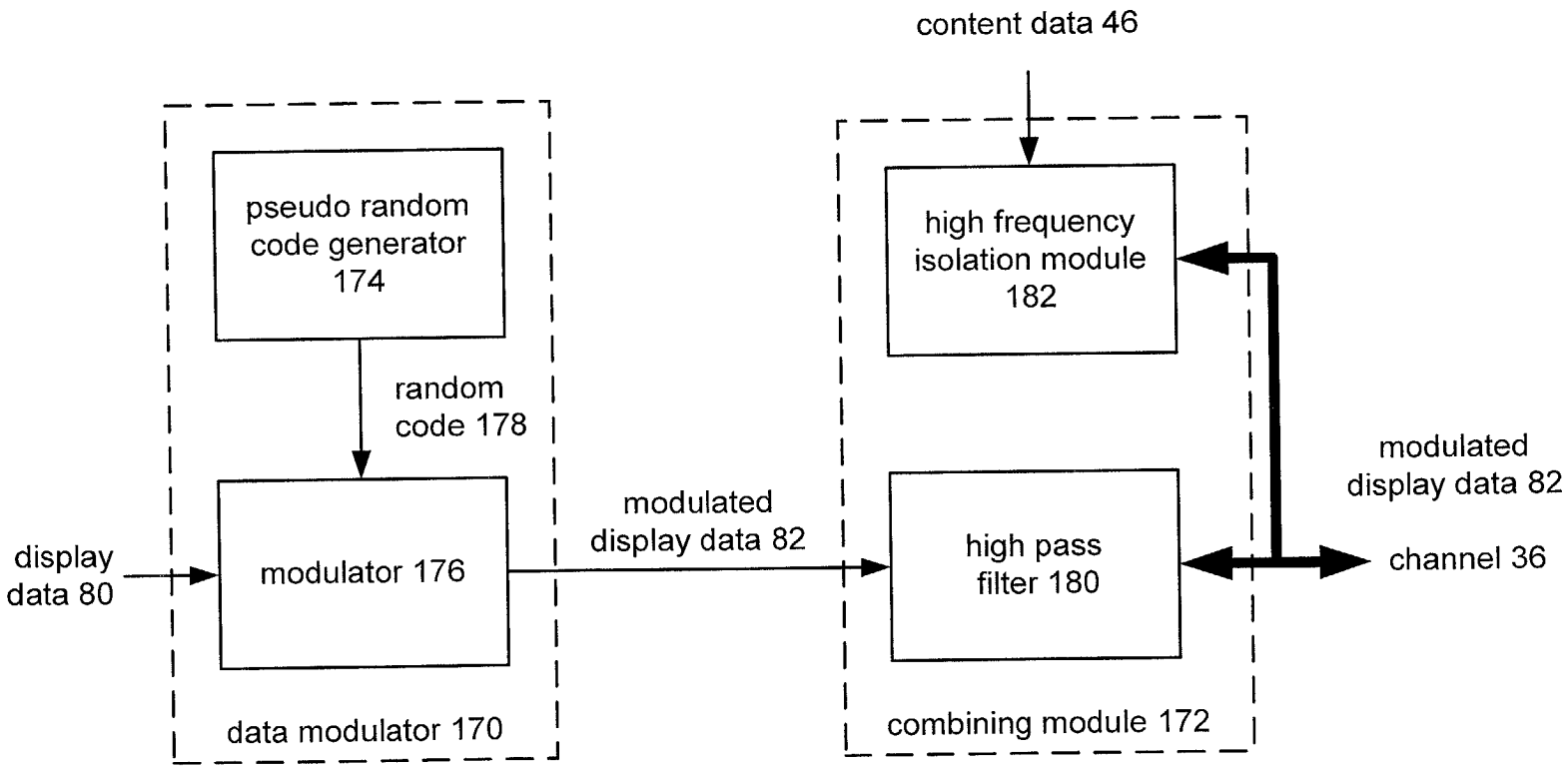
content data 46
pseudo random code generator 174
random code 178
high frequency isolation module 182
modulated display data 82
display data 80
modulator 176
modulated display data 82
high pass filter 180
channel 36
data modulator 170
combining module 172

FIG. 9 76

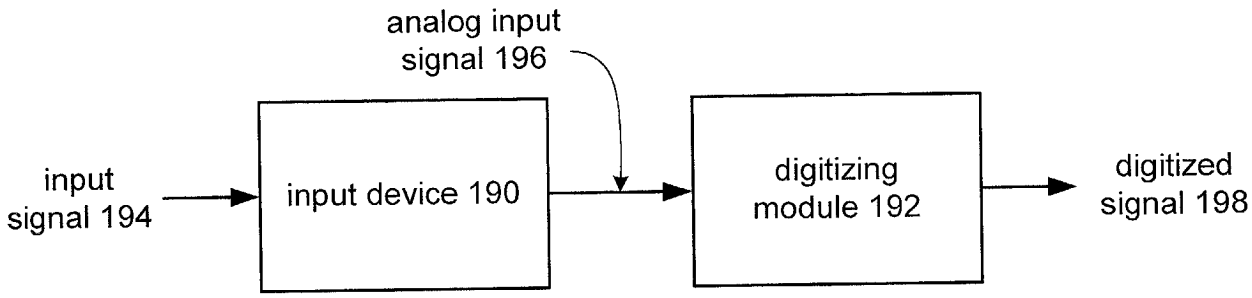

FIG. 10

52 or 112

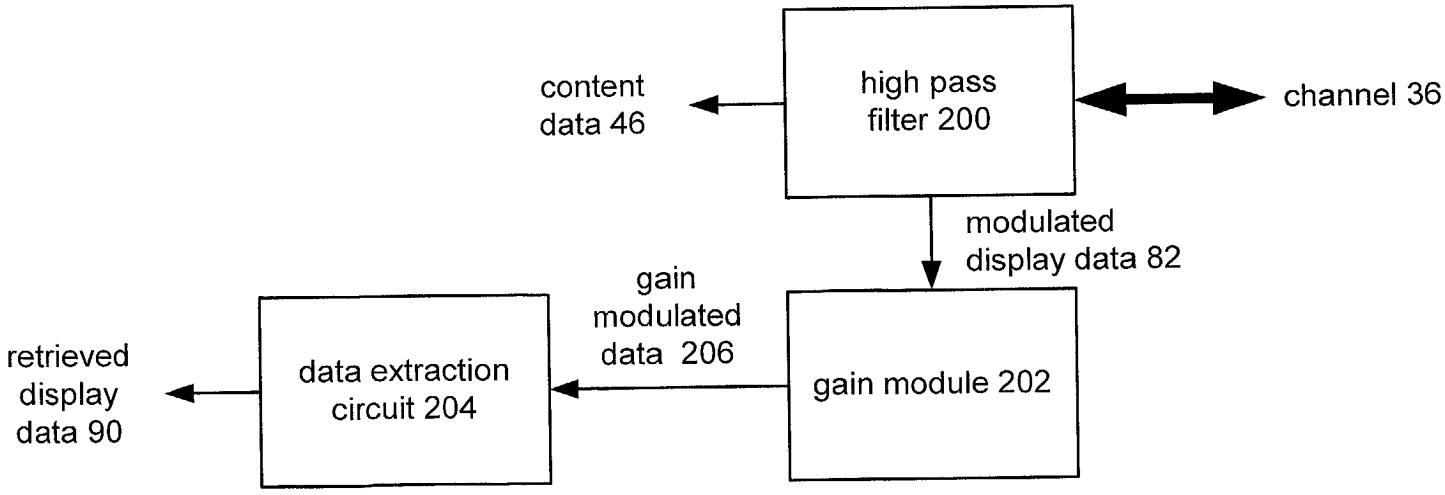

FIG. 11

84 or 110

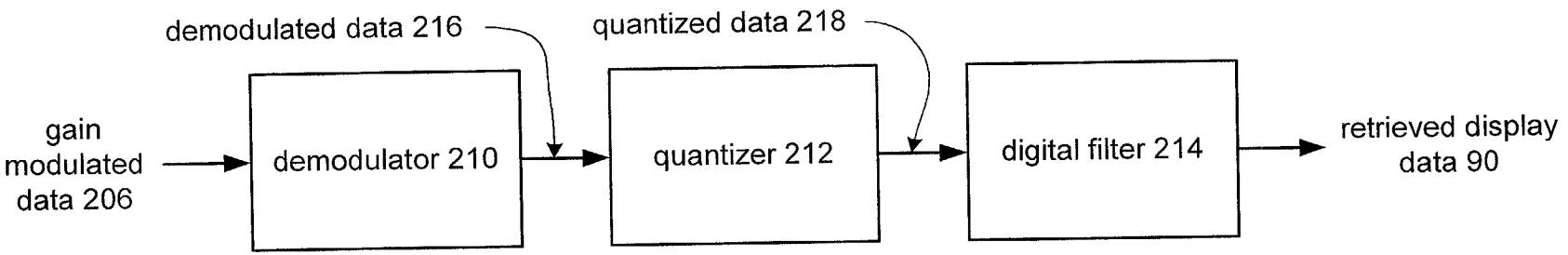

FIG. 12 204

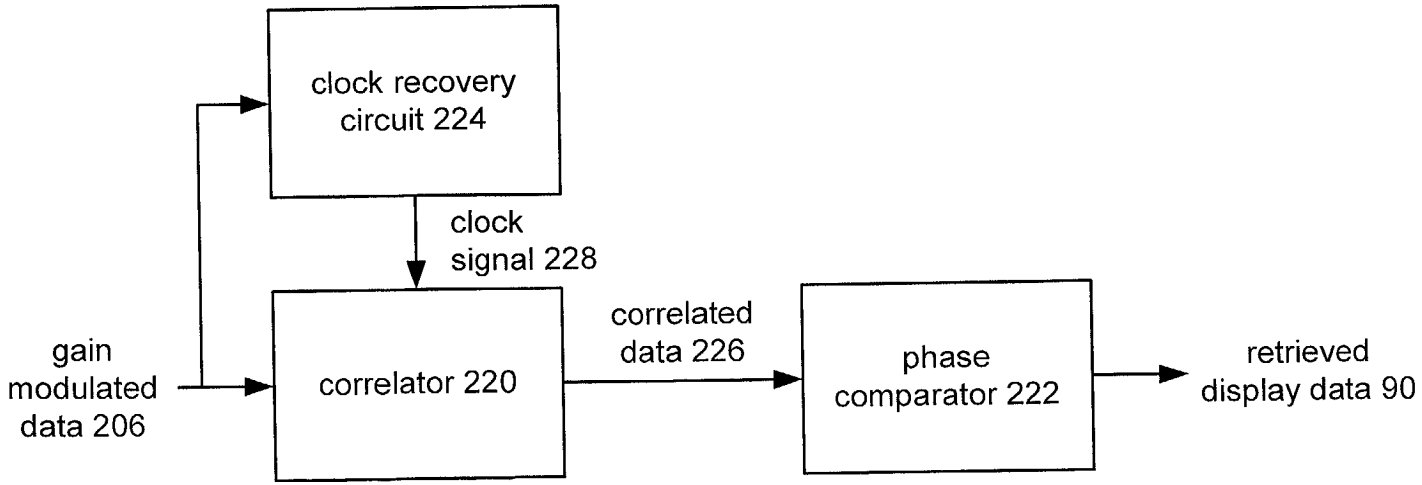

FIG. 13 204

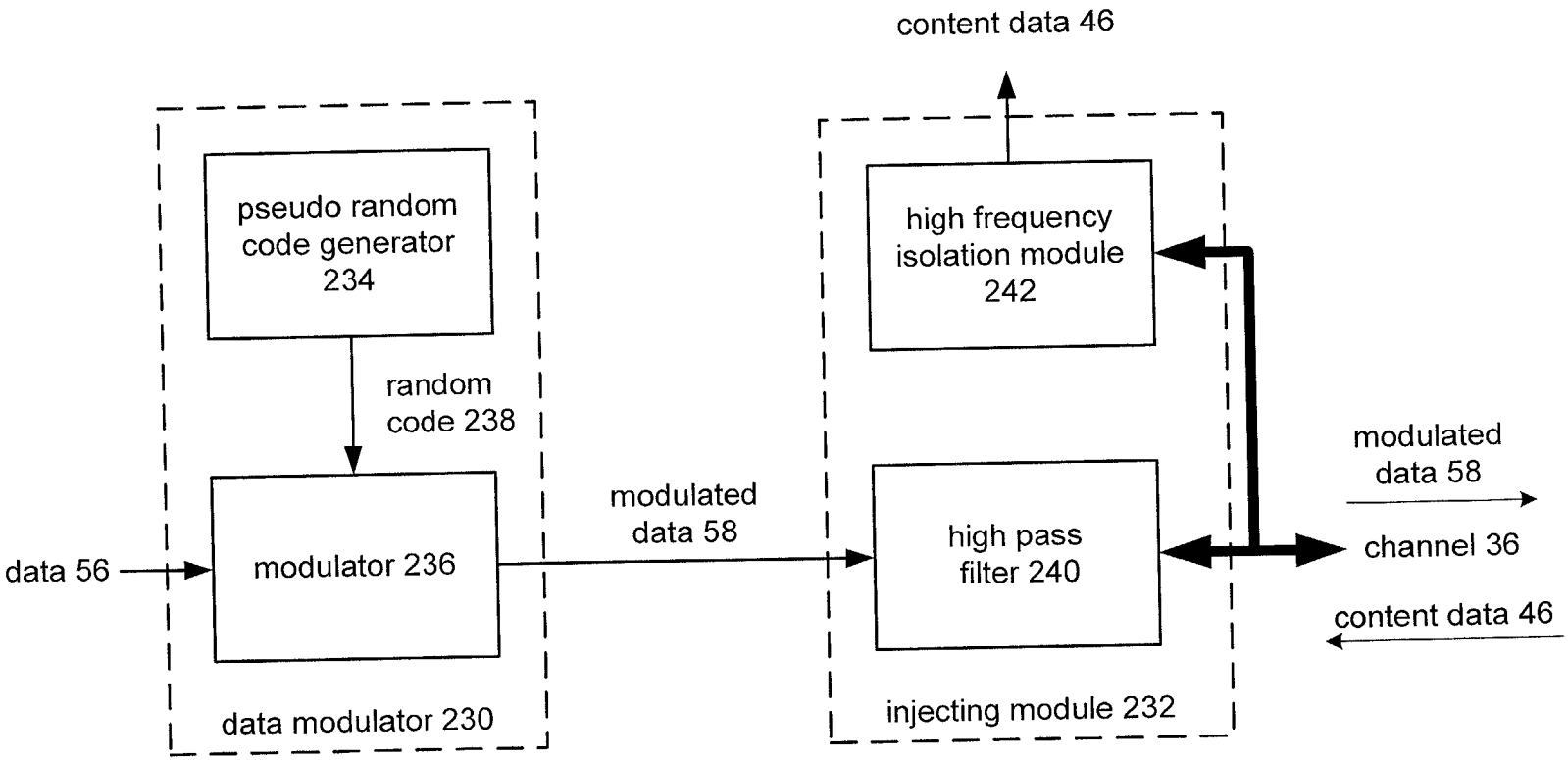
content data 46
pseudo random code generator 234
random code 238
high frequency isolation module 242
modulated data 58
data 56
modulator 236
modulated data 58
high pass filter 240
channel 36
content data 46
data modulator 230
injecting module 232

FIG. 14 84

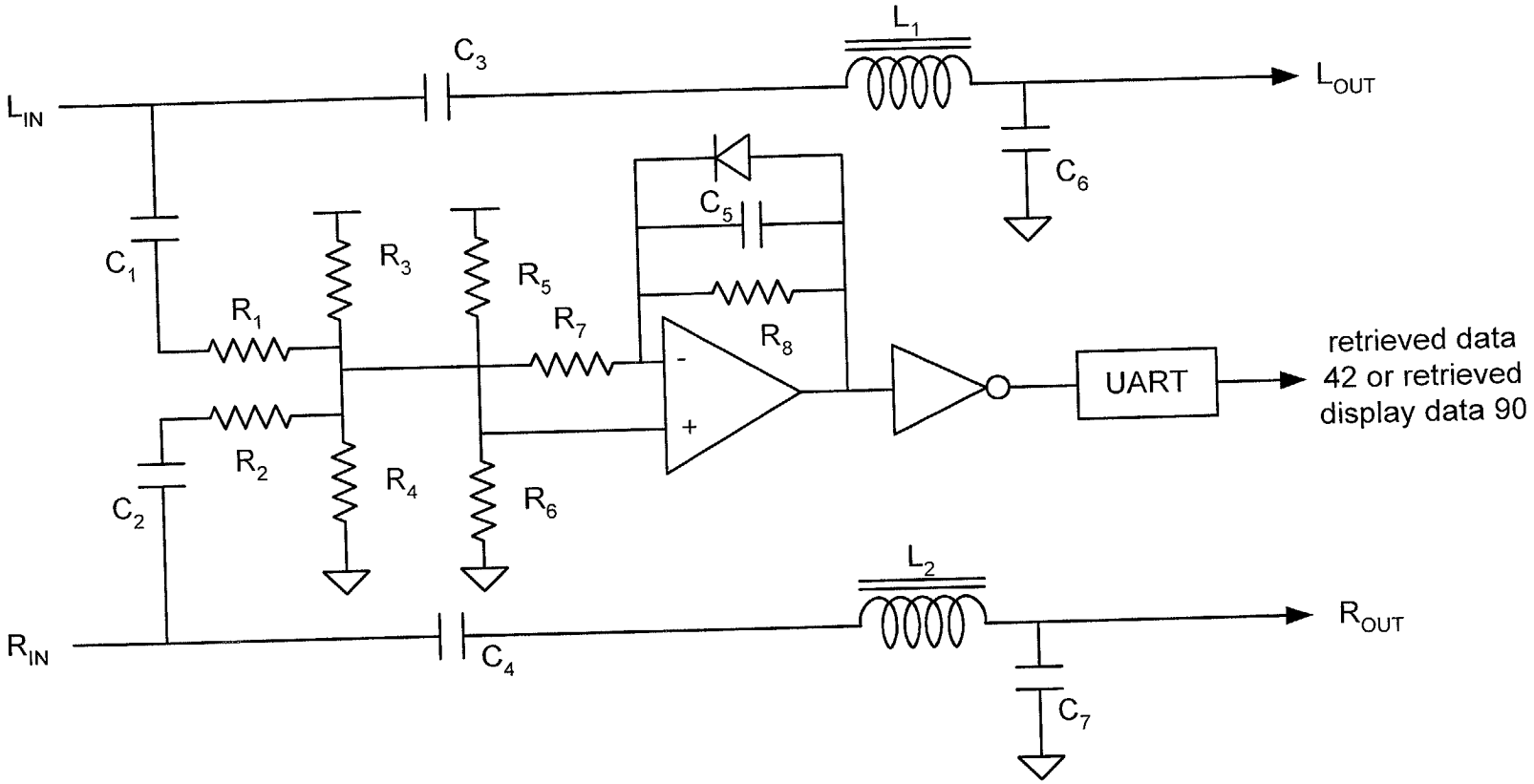

FIG. 15

receiving portion of transceiving module 38,50, 76, 84, 106, 110

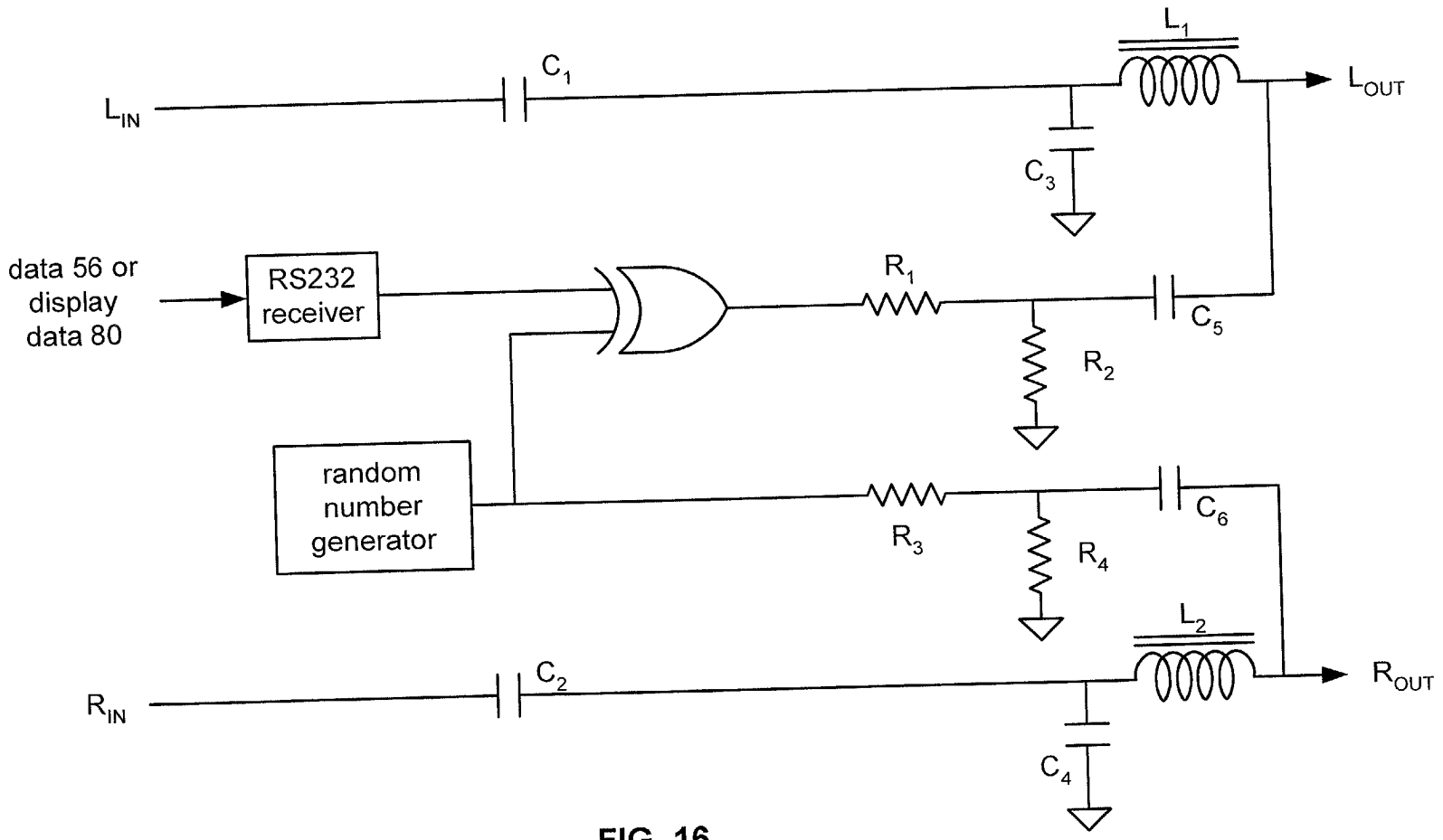

FIG. 16

transmitting portion of transceiving module 38,50, 76, 84, 106, 110

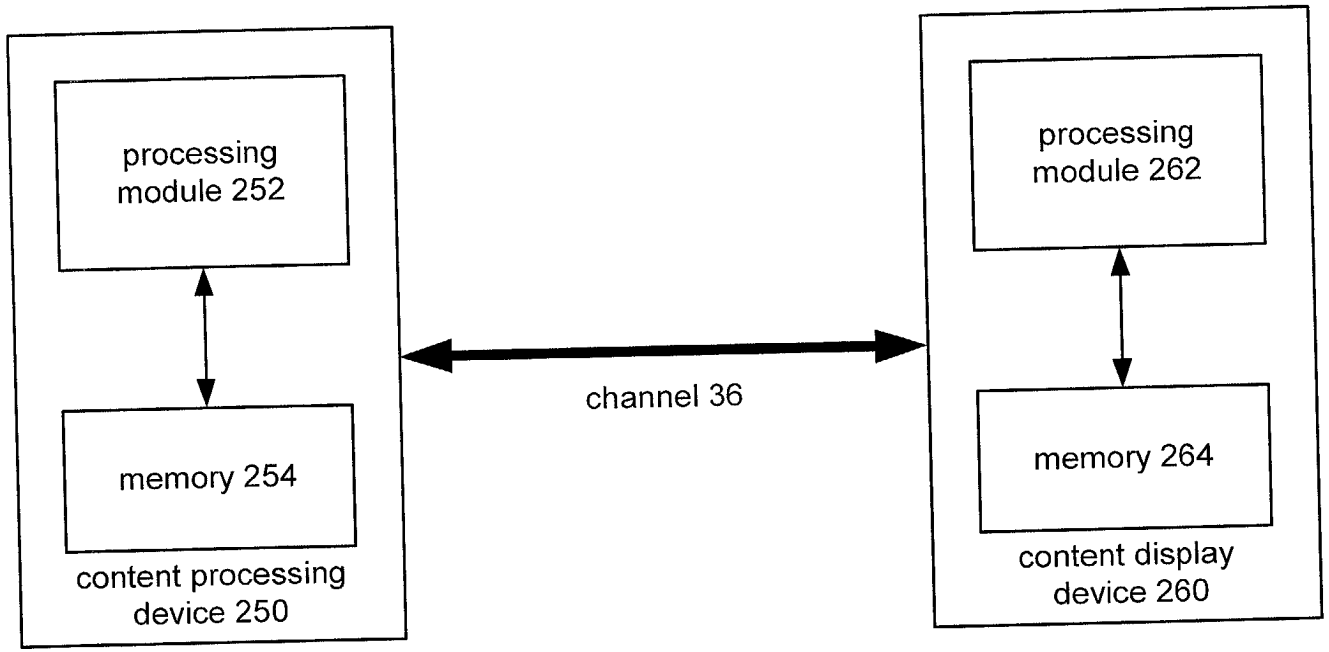
processing module 252
memory 254
content processing device 250
channel 36
processing module 262
memory 264
content display device 260

FIG. 17

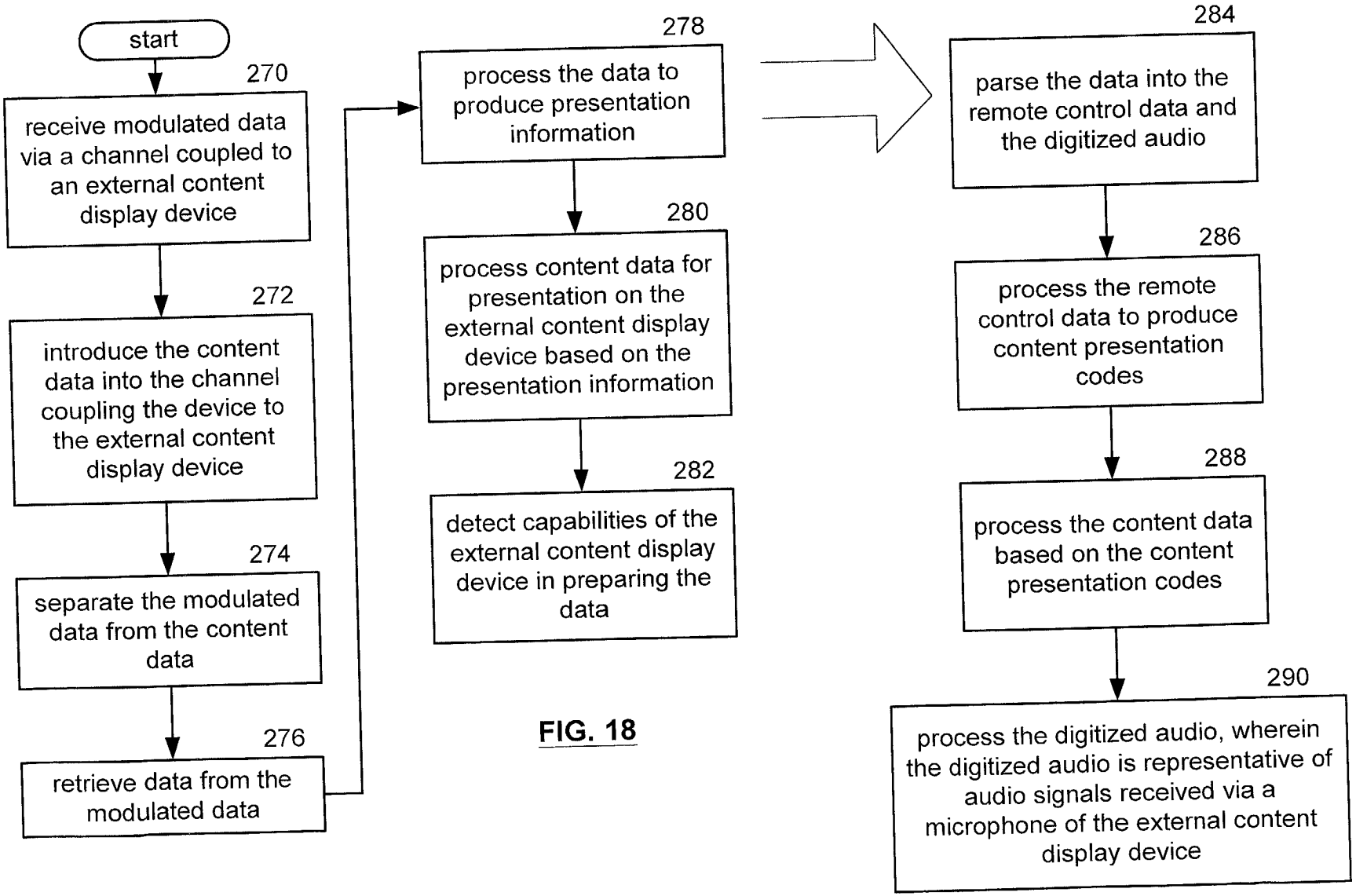
start
270
receive modulated data via a channel coupled to an external content display device
272
introduce the content data into the channel coupling the device to the external content display device
274
separate the modulated data from the content data
276
retrieve data from the modulated data
278
process the data to produce presentation information
280
process content data for presentation on the external content display device based on the presentation information
282
detect capabilities of the external content display device in preparing the data
284
parse the data into the remote control data and the digitized audio
286
process the remote control data to produce content presentation codes
288
process the content data based on the content presentation codes
290
process the digitized audio, wherein the digitized audio is representative of audio signals received via a microphone of the external content display device

FIG. 18

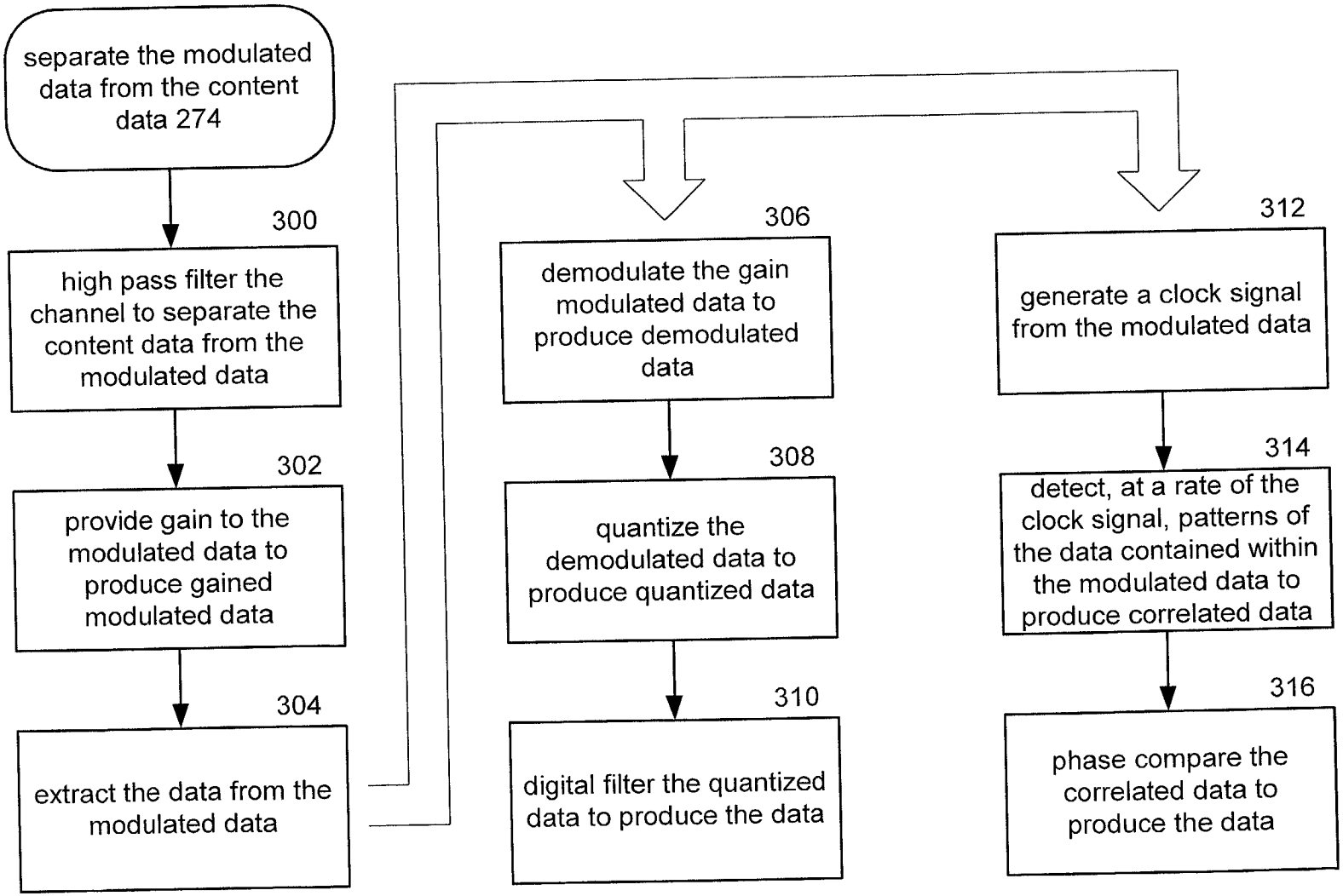
separate the modulated data from the content data 274
300
high pass filter the channel to separate the content data from the modulated data
302
provide gain to the modulated data to produce gained modulated data
304
extract the data from the modulated data
306
demodulate the gain modulated data to produce demodulated data
308
quantize the demodulated data to produce quantized data
310
digital filter the quantized data to produce the data
312
generate a clock signal from the modulated data
314
detect, at a rate of the clock signal, patterns of the data contained within the modulated data to produce correlated data
316
phase compare the correlated data to produce the data

FIG. 19

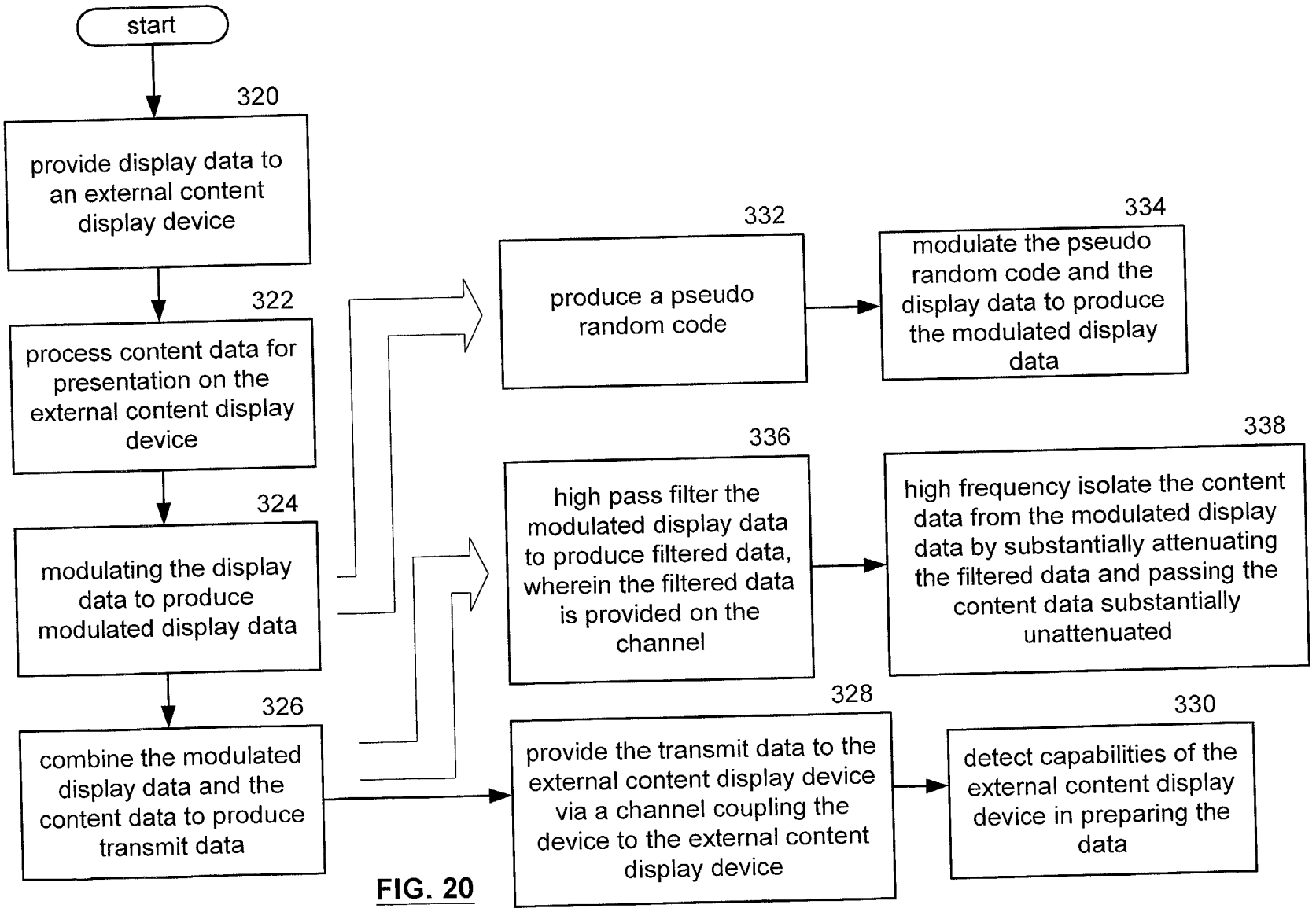
start
320
provide display data to an external content display device
322
process content data for presentation on the external content display device
324
modulating the display data to produce modulated display data
326
combine the modulated display data and the content data to produce transmit data
332
produce a pseudo random code
334
modulate the pseudo random code and the display data to produce the modulated display data
336
high pass filter the modulated display data to produce filtered data, wherein the filtered data is provided on the channel
338
high frequency isolate the content data from the modulated display data by substantially attenuating the filtered data and passing the content data substantially unattenuated
328
provide the transmit data to the external content display device via a channel coupling the device to the external content display device
330
detect capabilities of the external content display device in preparing the data

FIG. 20

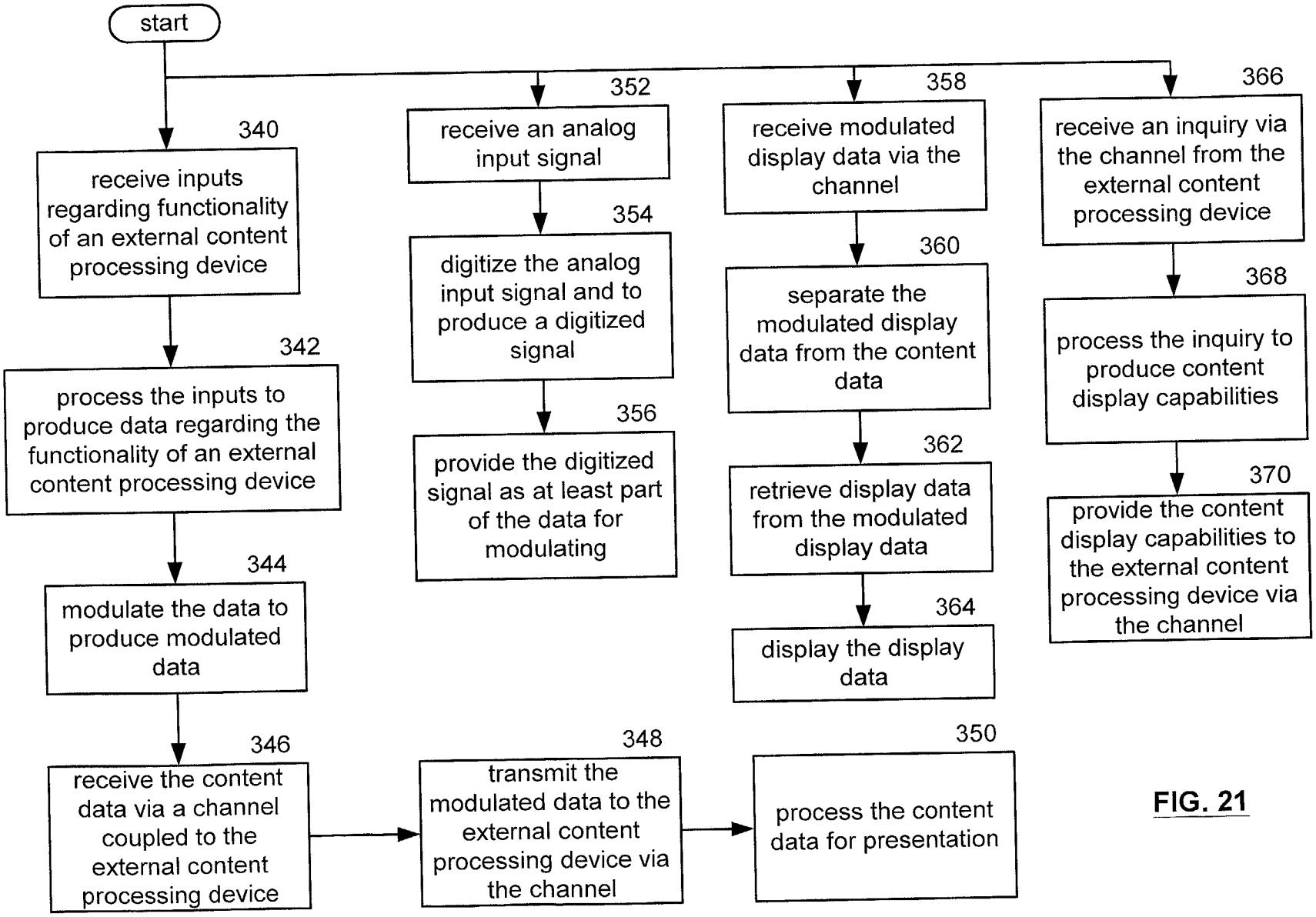
start
340
receive inputs regarding functionality of an external content processing device
342
process the inputs to produce data regarding the functionality of an external content processing device
344
modulate the data to produce modulated data
346
receive the content data via a channel coupled to the external content processing device
352
receive an analog input signal
354
digitize the analog input signal and to produce a digitized signal
356
provide the digitized signal as at least part of the data for modulating
358
receive modulated display data via the channel
360
separate the modulated display data from the content data
362
retrieve display data from the modulated display data
364
display the display data
366
receive an inquiry via the channel from the external content processing device
368
process the inquiry to produce content display capabilities
370
provide the content display capabilities to the external content processing device via the channel
348
transmit the modulated data to the external content processing device via the channel
350
process the content data for presentation

FIG. 21

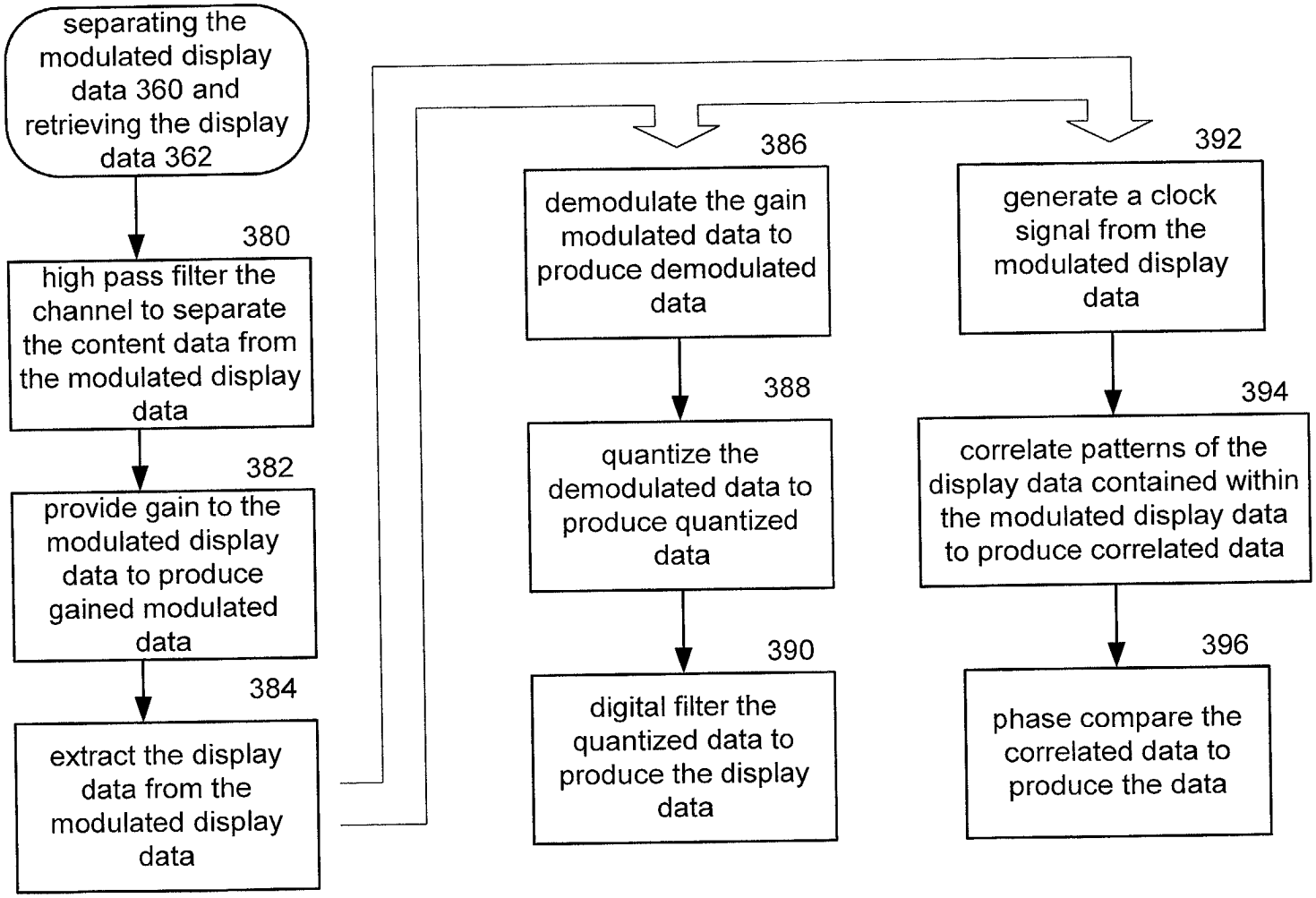
separating the modulated display data 360 and retrieving the display data 362
380
high pass filter the channel to separate the content data from the modulated display data
382
provide gain to the modulated display data to produce gained modulated data
384
extract the display data from the modulated display data
386
demodulate the gain modulated data to produce demodulated data
388
quantize the demodulated data to produce quantized data
390
digital filter the quantized data to produce the display data
392
generate a clock signal from the modulated display data
394
correlate patterns of the display data contained within the modulated display data to produce correlated data
396
phase compare the correlated data to produce the data

FIG. 22

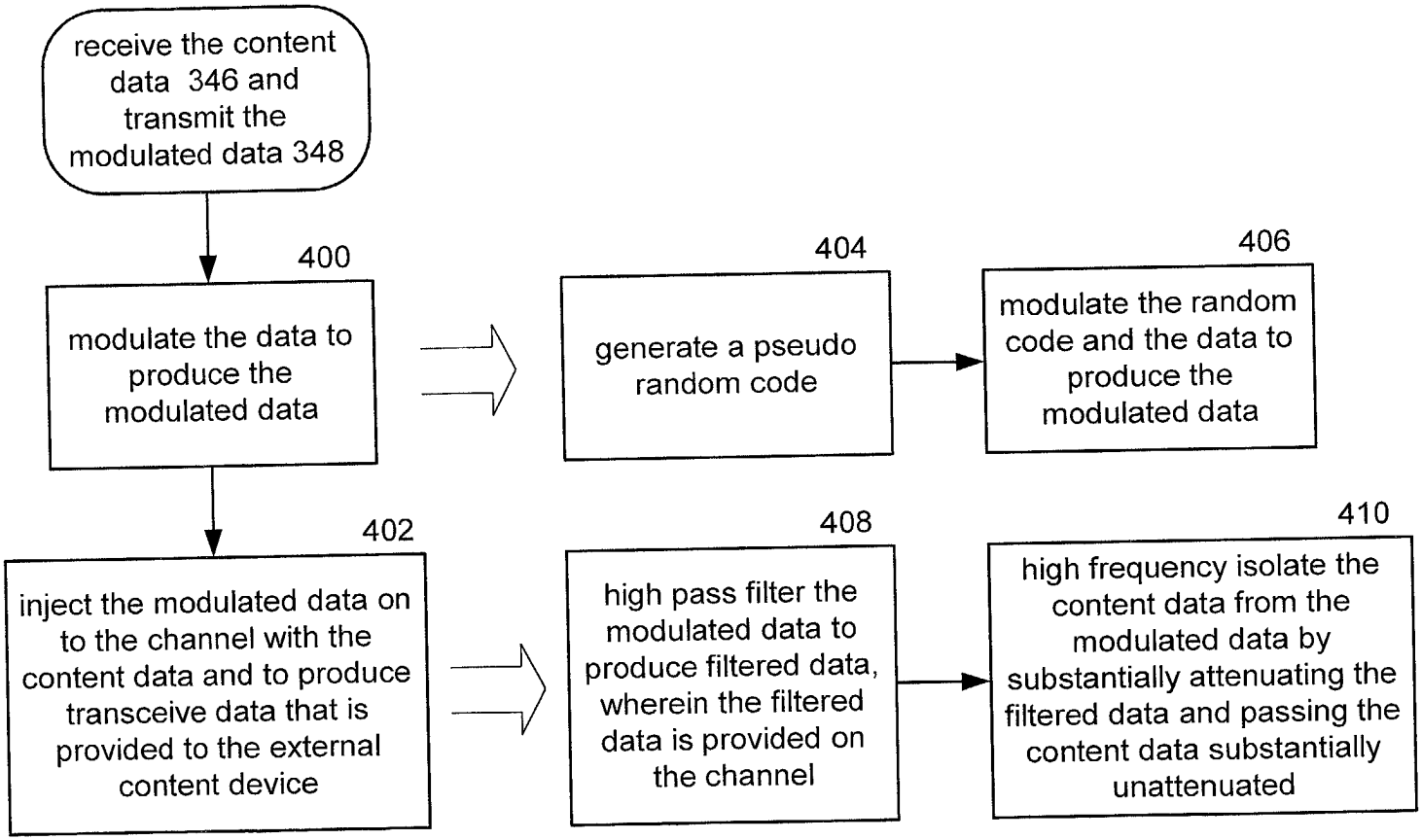
receive the content data 346 and transmit the modulated data 348
400
modulate the data to produce the modulated data
402
inject the modulated data on to the channel with the content data and to produce transceive data that is provided to the external content device
404
generate a pseudo random code
406
modulate the random code and the data to produce the modulated data
408
high pass filter the modulated data to produce filtered data, wherein the filtered data is provided on the channel
410
high frequency isolate the content data from the modulated data by substantially attenuating the filtered data and passing the content data substantially unattenuated

FIG. 23

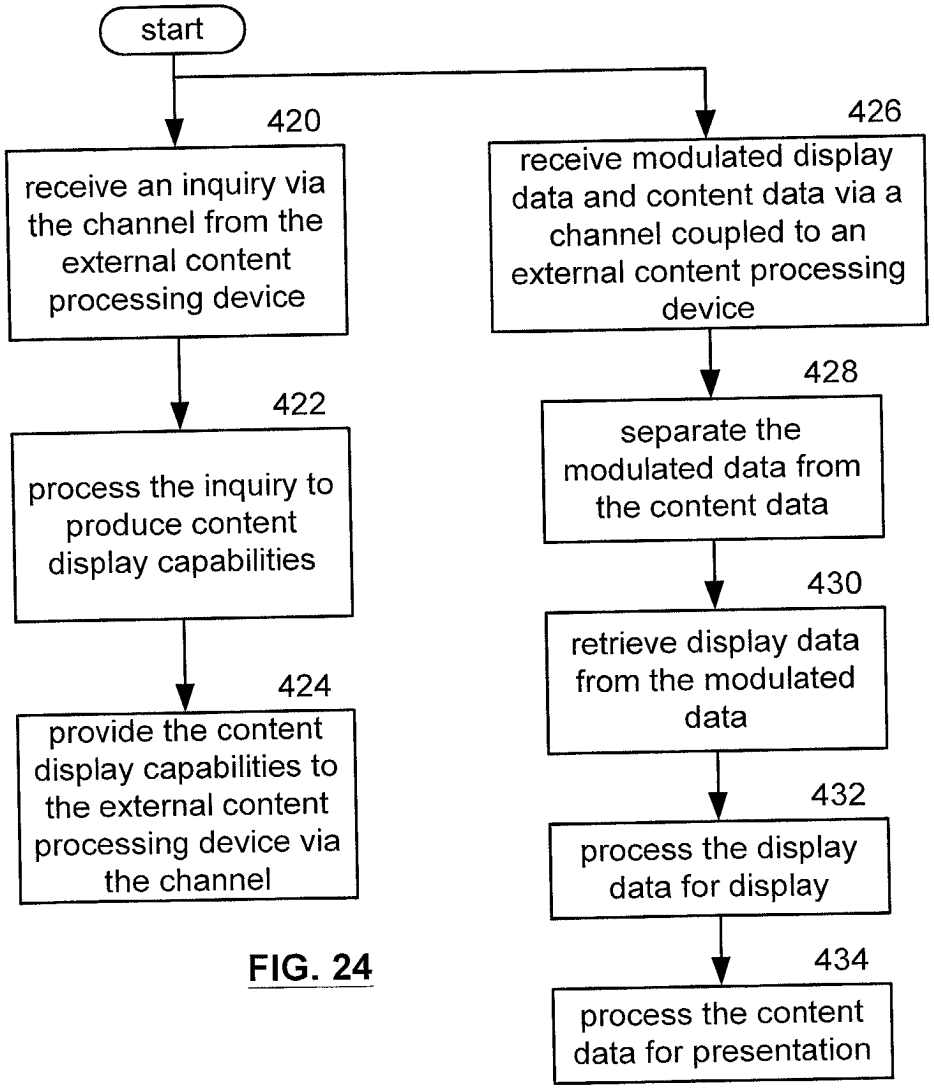
start
420
receive an inquiry via the channel from the external content processing device
422
process the inquiry to produce content display capabilities
424
provide the content display capabilities to the external content processing device via the channel
426
receive modulated display data and content data via a channel coupled to an external content processing device
428
separate the modulated data from the content data
430
retrieve display data from the modulated data
432
process the display data for display
434
process the content data for presentation

FIG. 24

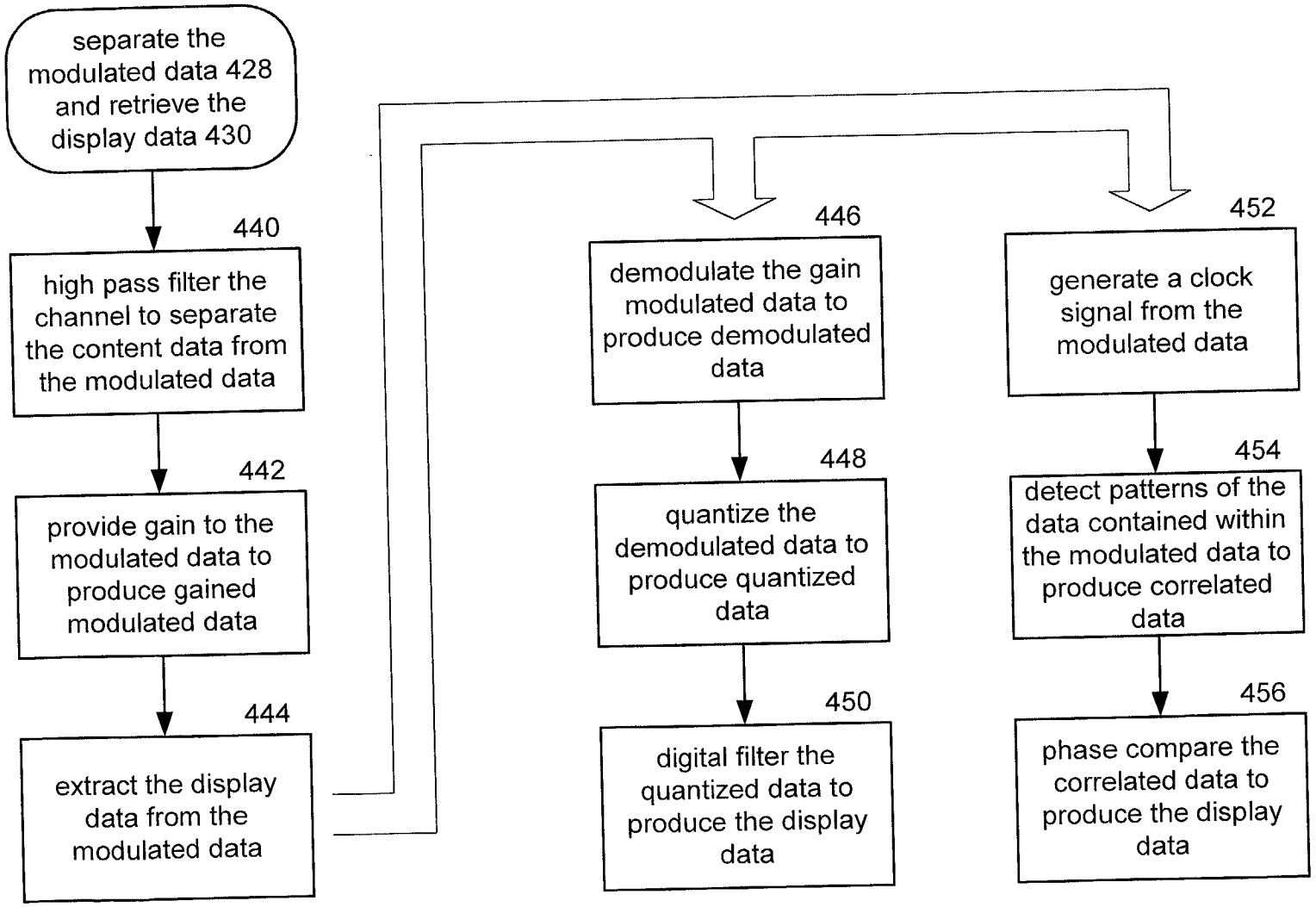
separate the modulated data 428 and retrieve the display data 430
440
high pass filter the channel to separate the content data from the modulated data
442
provide gain to the modulated data to produce gained modulated data
444
extract the display data from the modulated data
446
demodulate the gain modulated data to produce demodulated data
448
quantize the demodulated data to produce quantized data
450
digital filter the quantized data to produce the display data
452
generate a clock signal from the modulated data
454
detect patterns of the data contained within the modulated data to produce correlated data
456
phase compare the correlated data to produce the display data

FIG. 25

PATENT APPLICATION
Docket No.: SIG000053

DECLARATION AND POWER OF ATTORNEY
Pursuant to 37 C.F.R 1.63 and 1.67

As a below named inventor, I hereby declare that:
My residence, post office address and citizenship are as stated below next to my name; and
I believe that I an inventor of the subject matter of a patent application entitled:

METHOD AND APPARATUS FOR PROCESSING CONTENT DATA

The specification for the patent application (check one):

[X] is attached hereto.

[ ] was filed on as Application Serial No.
and was amended on (if applicable).

[ ] was filed as PCT International Application No. PCT/ on
and was amended on (if applicable).

[ ] was filed on as Application Serial No.
and was issued a Notice of Allowance on

I hereby state that I have reviewed and understood the contents of the above identified patent application, including the claims as amended by any amendment referred to above or as allowed as indicated above.

I acknowledge the duty to disclose all information known to me to be material to the patentability of this patent application as defined in 37 C.F.R. Section 1.56. If this is a continuation-in-part (CIP) application, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of 35 U.S.C. Section 112, I acknowledge the duty to disclose to the Office all information known to me to be material to patentability of the application as defined in 37 C.F.R. Section 1.56 which became available between the filing data of the prior application and the national or PCT international filing date of this CIP application.

I hereby claim foreign priority benefits under 35 U.S.C. Sections 119 and 365 of any foreign application(s) for patent(s) or inventor's certificate(s) listed below. I have also identified below any foreign application(s) for patent(s) or inventor's certificate(s) filed by me or my assignee which: disclose the subject matter claimed in this patent application; and have a filing date that is either: (1) before the filing date of the application on which my priority is claimed; or, (2) before the filing date of this application when no priority is claimed:

Prior Foreign Patents
(list number, country, filing date MDY, date laid open, date granted or patented)

I hereby claim the benefit under 35 U.S.C Sections 120 and 365 of any United States application(s) listed below and PCT international application(s) listed below:

Prior U.S. or PCT Applications

Application No.	Mo/Day/Yr Filed	Status

I hereby appoint Timothy W. Markison, Registration No. 33,534 of SigmaTel Inc., 2700 Via Fortuna, Sutie 500, Austin, Texas 78746 as my attorney, with full power of substitution and revocation, to prosecute this patent application and to transact all business in the United States Patent and Trademark Office connected therewith, and to file and prosecute any international patent applications filed thereon before any international authorities under the Patent Cooperation Treaty, and I hereby authorize him to act and rely on instructions from and communicate directly with the person/assignee/attorney/firm/ organization who/which first sent this case to them and by whom/which I hereby declare that I have consented after full disclosure to be represented unless/until I instruct them in writing to the contrary.

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of this patent application or any patent issued thereon.

Inventor(s)

Bogard Daniel T. 3101 Mohawk Road Austin Texas 78757	citizen of:	Signature: Daniel T. Bogard Date: 10/31/00
	citizen of:	Signature: _____ Date: _____
	citizen of:	Signature: _____ Date: _____
	citizen of:	Signature: _____ Date: _____
	citizen of:	Signature: _____ Date: _____
	citizen of:	Signature: _____ Date: _____